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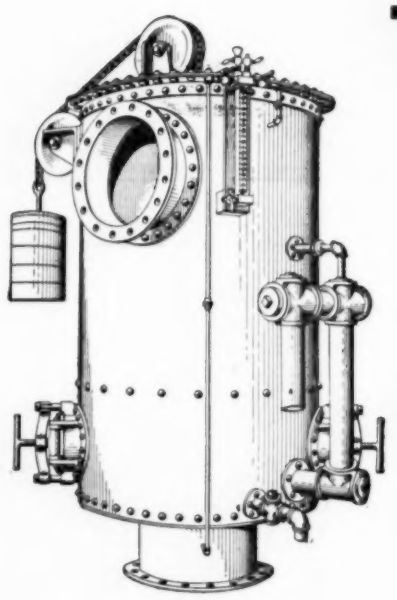
A TAR EXTRACTOR THAT EXTRACTS



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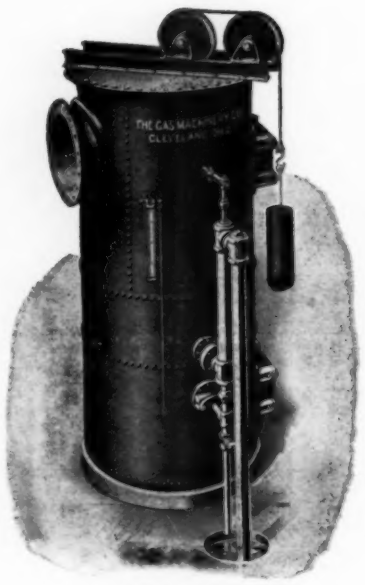


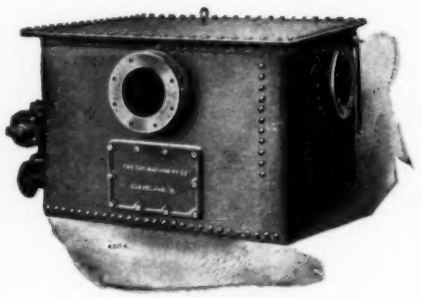
DRY TYPE.

TAR EXTRACTORS

FOR

CARBURETTED WATER GAS.

The Gas Machinery Company,
CLEVELAND, OHIO.



WET TYPE.

THE AMERICAN
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VOL. CIII., No. 9. NEW YORK, AUGUST 30, 1913. WHOLE No. 2,099

ELECTROLYSIS MITIGATION.

The latest approved practice in preventing damage by electrolysis, is embodied in the following order of the Manitoba Public Utilities Commission:

In the Matter of an Application by the City of Winnipeg to Compel the Winnipeg Railroad Company to Establish Proper Measures of Prevention of Damage to Underground Cables and Mains by Electrolysis by Electrical Currents from the Electric Railway System of the Company.

Upon reading an application by the City of Winnipeg, dated the 24th day of July, A.D. 1913, after notice to the said Company for an order:

(1) To compel the Winnipeg Electric Railway Company in the operation of its street railway system in the City of Winnepeg, to install and establish a proper system of bonding and cross-bonding of the rails in order to make the rails a continuous conductor, and thus secure a good and proper return path for the electric current, and to properly rebond all defective bonding now or hereafter existing.

(2) To properly bond and connect solid rails and track to the stations of the Company.

(3) To install a sufficient number of substations at different points of the system, with a view to diminishing the amount of current to be returned through the rails in the center of the City.

(4) To establish and institute a system of special bonding and cross-bonding work at intersections.

(5) To establish and conduct a proper system of inspection of track returns in the construction and extension, as well as in the operation of the said street railway system.

(6) To discontinue the practice of connecting the Company's system with the Government Telephone Cables, and to remove all such connections as may now or hereafter exist.

(7) To discontinue the use of ground plates at sides of bridges for carrying return currents from one side of a river bank to the other, and generally adopt such means and take such precautions as may from time to time be necessary to ensure the return along a single path, of electric current to the station at which it is generated, and to avoid and prevent the escape, diversion or roaming of such current on its return, through other than the rails and conductors provided for that purpose.

Upon reading an application, dated June 26th, 1914, from the Greater Winnipeg Water District, that consideration be given the matter of electrolysis, in so far as it may in any way affect the proposed pipe line of the Greater Winnipeg Water District, and the distribution system or systems that may be installed in the various municipalities or parts of municipalities forming the District.

Upon reading the briefs submitted by the City of Winnipeg on June 15, 1914, outlining specific cases of damage to their cables and water mains, which damage it is contended, was caused by electrolysis from the stray currents of the Winnipeg Electric Railway.

Upon reading the briefs submitted by the Manitoba Government Telephone Commission, on June 12, 1914, outlining specific damage to their underground cables in the said city which damage it is contended, was caused by electrolysis from stray currents of the Winnipeg Electric Railway Company.

Upon reading the brief submitted by the Winnipeg Electric Railway Company on June 15, 1914, maintaining that every due precaution was being taken by that company to mitigate all damage due to elecIrolysis.

And Whereas it was expedient to appoint an Electrical Engineer independent of the parties for the purpose of investigating, reporting and advising upon the matters involved in the above applications, and consequently, after due notice to the said City and Company, Albert P. Ganz., Esq., was appointed and authorizee to investigate, report and advise upon the matters involved in or pertaining to the protection of the property of the parties above named from electrolysis by stray electrical currents from the Winnipeg Electric Railway Company's system.

And Whereas the above Albert P. Ganz, Esq., did, after notice to and after hearing at various times the representatives of all the said parties, investigate, consider and report on the aforementioned matters, and did make recommendations for the mitigation of damage by electrolysis resulting from such stray electrical currents, and the said report having been filed and considered by the Commission, as part of the evidence and material on the application by virtue of The Public Utilities Act.

And Whereas the aforesaid parties, by their solicitors officers and employees have been heard at various times heretofore on the subject of the said application, and investigation and of this order;

It is ordered:

(1) Every rail joint in the tracks of the electric railway system of the said Company shall be so constructed and maintained that its resistance does not exceed the resistance of eight (8) feet of continuous rail. Tests of the resistance of rail joints shall be made and recorded at least once every year, and when defective joints are found they shall be promptly repaired.

(2) The two rails of every single track in the said system, and the four rails of every double track, shall be maintained adequately cross-bonded, and all special track work shall be spanned by copper wire jumpers of adequate current-carrying capacity.

(3) All conductors which connect the tracks of the electric railways in the said system to the direct-current supply stations shall be insulated from the earth.

(4) No metallic connections shall be permitted by the said Company in its system between water, gas or underground pipes and any part of the electric circuit of the electric railway.

(5) The rails or other metallic conductors forming parts of current-carrying electric circuits of the said electric railway system, which are not insulated from earth, shall be designed, constructed, operated and maintained, so that the average potential difference during any ten (10) consecutive minutes between any two points one thousand (1000) feet or less apart on said rails or other metallic conductors will not exceed one (1) volt, and, further, so that the average potential difference during any ten (10) consecutive minutes between any two points more than one thousand (1000) feet apart on said rails or other metallic conductors within the area comprised by Winnepeg (including Elmwood) and St. Boniface, will not exceed seven (7) volts, (approximately the value adopted by the British Board of Trade).

On account of the concentration and great importance of the underground structures in the neighborhood of the corner of Portage Avenue and Main Street, Winnipeg, all feeders connecting to the tracks within a radius of Fifteen Hundred (1500) feet from the said corner shall be so proportioned as to maintain their connection points in the tracks at the same or slightly lower potential than the

tracks at the said corner during peak load. Owing to the proximity of the City Water Works, and of the important water main leading to the said works, to Substation No. 8 on Logan Avenue, at McPhillips Street, all feeders from the said station to the tracks shall be proportioned for substantially the same voltage drop during peak load. The track voltage requirements of this recommendation are to apply only to normal operating conditions on a business day, and not to occasional abnormal conditions in street railway traffic brought about, for example, by fires, storms or holiday crowds. If at any time such difference of potential exceeds the above the Company shall take immediate steps to bring it below such limit.

(6) Potential wires insulated from earth shall be installed by the Company in the district of every substation of the Company whereby contact may be made to the tracks at each point where a return feeder from this station connects to the tracks, at the feeding limits of each substation on the principal track lines where these terminate within the limits of Winnipeg (including Elmwood) and St. Boniface, and at the points where principal track lines cross the limits comprising Winnipeg (including Elmwood) and St. Boniface. These potential wires shall terminate in the substations in such a way that they can be conveniently connected to an indicating volt-meter and to a 24-hour recording voltmeter. One voltmeter of each type shall be provided for each direct-current supply station, so arranged that the potential difference between any two of the above described points in the track system can be measured or automatically recorded. A potential wire shall also be connected to a nearby water pipe, by means of which the potential of the negative bus-bar referred to earth may be measured or recorded.

(7) By means of the potential wires and voltmeters, provided for in clause (6) above, the following measurements and records shall be obtained: The average potential difference between the tracks at a feeder connection point near the substation and each other feeder connection shall be determined from readings of the indicating voltmeter, taken and recorded for a period of about five minutes during the peak load hour once every month. From such test the point in the tracks which is at the lowest potential shall be determined. A twenty-four hour record of the potential difference between each point in the tracks at the feeding limits or at the city boundary and the tracks at the point of lowest potential shall then be determined once every month, on a normal business day. The potential difference between the negative bus-bar and a nearby city water pipe shall also be obtained at least once every day during peak load. If this potential difference should fall at any time to such a low value as to indicate grounding of the negative bus-bar, steps shall be taken by the said company to remove the ground connection.

(8) All records of the tests described in the foregoing clauses, as well as the recording meters and meter charts, shall be open to inspection from time to time by an authorised representative of the Commission. True copies of all records, as soon as completed, shall be forwarded by the company to this Commission, as also recording meter charts, within twenty-four hours after the taking of such records and charts.

(9) After the work required by Clauses 1, 2, 3, 4, 5 and 6 of this order has been done, in every case all drainage connections from underground lead cable sheaths to railway return circuit in Winnipeg, shall in every instance be opened and kept open, and tests of the potential of these cable sheaths referred to other structures and of current on the cable sheaths, shall (on twenty-four hours' written notice to the owner of such cable sheaths of the time and place at which the test is to be made), be made by the Company to determine the electrolysis condition of such cable sheaths. If, in such case, cable sheaths shall be found to require additional protection, a limited amount of electrical drainage may be applied by the Company upon application to this Commission on notice to the owner of the cable sheath, and subject to such directions as may be then given by this Commission. Such drainage connections must be arranged to apply equally to all of the underground cable systems, so as to avoid setting up serious potential differences between the lead sheaths of the different cable systems. They must also be so arranged and maintained as to drain off the least current consistent with the complete protection of the cables, and without setting up dangerous voltages to other underground structures. A suitable fuse, a knife switch, and an ammeter, shall be installed in each drainage connection, and daily readings of the current drained from the cables during the peak load hour shall be obtained and recorded. The drainage connection must be opened whenever the station is not in operation.

(10) In future constructions and reconstructions of direct current electric railways employing the running tracks as part of the electric circuit, such track construction shall be employed, in addition to that already required by the previous clauses, as will give the greatest practical resistance between tracks and earth for the existing conditions. Without limiting the foregoing, this must be done, particularly where such railways cross or run close to underground pipe or cable lines.

NOTE.—Clauses Numbers 1, 2, 3 and 4 of the foregoing are to apply to the railway lines of the Company, as far as these lines are supplied with direct current from the substations located within or near the limits of Winnipeg. Clauses Numbers 5, 6 and 7, however, are not made to apply to the lines extending beyond the limits of Winnipeg and St. Boniface, because these lines are generally located on country roads where the tracks can be substantially insulated from ground, and where there are at present no underground structures which could be affected by electrolysis.

(11) In future constructions and reconstructions by the Company (within the Province of Manitoba, but excepting the cities of Winnipeg and St. Boniface, which are covered by to previous clauses) of direct current electric railways employing the running tracks as part of the electric circuit, Clauses numbers 1, 2, 3 and 4 shall be complied with by the Company, and, in addition, such track construction shall be employed by the Company as will give the greatest practical resistance between the tracks and earth in the existing conditions. If such electric railways operate within limits where there is valuable underground property which may be endangered by electrolysis, the track voltage limitations, the potential wires for measuring these voltages, and the periodic tests of these voltages, as required in Clauses numbers 6, 7 and 8 hereof, shall be complied with within the limits affected.

(12) That the Winnipeg Electric Railway Company shall prosecute the herein specified work and equipment to completion by midnight on the 31st day of October, A.D. 1916. That immediate action shall be taken by the Company to prosecute the work, and that monthly progress reports be delivered by the Company to this Commission. The work accomplished from month to month, after this order goes into effect, must be such as to show that all diligence is being wrought to execute this order. In the event of want of diligence from month to month, as aforesaid, by the Company in carrying out the work hereby ordered, the city may apply to this Commission for the imposition of penalty for delay, or for such other order as may appear proper. The Company shall, in the construction, maintenance and operation of its electric railway system, continuously observe and perform all the directions contained in this order.

(13) That in the design and construction of the insulated return feeder system, as required under this order, the Winnipeg Electric Railway Company shall employ a safety factor of 1.5, that is to say, in determining the amount of copper required in the return feeders to reduce the voltage drop to the limit prescribed under Clause 5, which will be estimated theoretically under the normal peak load conditions, such amount shall be increased to 50% of itself to insure the fulfilment of the requirements under varying operating conditions.

(14) That in the installation of insulated return feeders and potential wires along Portage Avenue, from Victoria Street to the St. James substation, and on Main Street from Graham Avenue to Sutherland Avenue, all wires and cables shall be placed underground, in conduits of the Company, laid in streets as either already existing, or (as to Main Street) to be constructed according to the plans heretofore approved for that purpose by the Council of the said City of Winnipeg.

(15) In the event of the herein specified work and equipment not being completed by midnight of October 31, 1916, the Winnipeg Electric Railway Company shall pay a penality of Fifty Dollars ($50.00) for each and every day that the default continues after the specified time.

It is ordered that the question of the costs of and incidental to the said investigation and report be reserved for subsequent order.

This order shall go into effect on the Twenty-first day after its date.

Sweden's Fuel Supply.

Sweden's importation of German coke is reported as exceptional recently. It is caused by the high prices of coal in England and the freights. Many Swedish steamers as well as State and private railroads are now using coke, either alone or mixed with coal or wood, with apparently good results as coke imports are continually increasing.

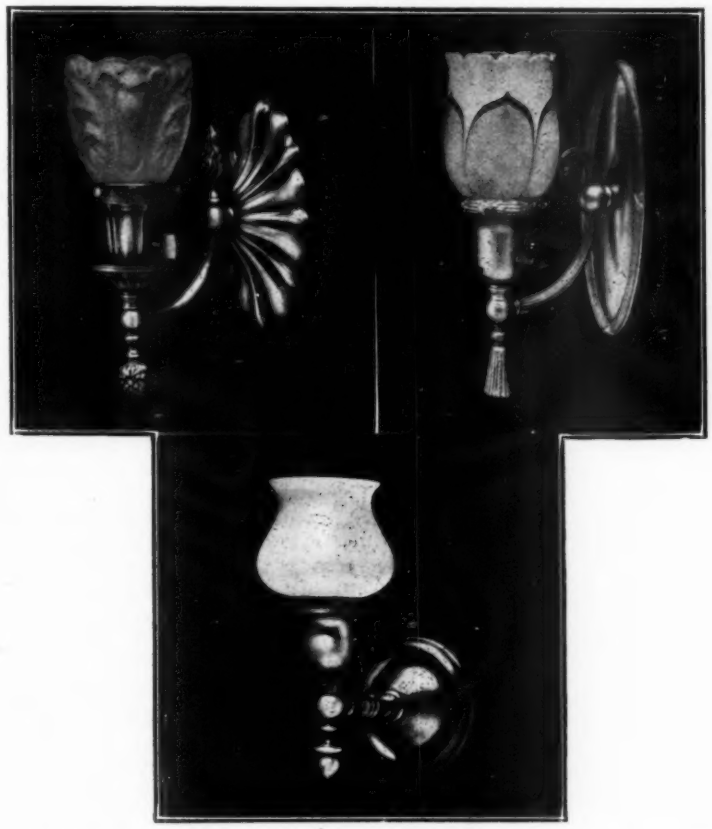
Attractive Bracket Lighting.

H. THURSTON OWENS.

Bracket lighting is the one form of lighting that has conformed more closely to period or style in design and application, than any other.

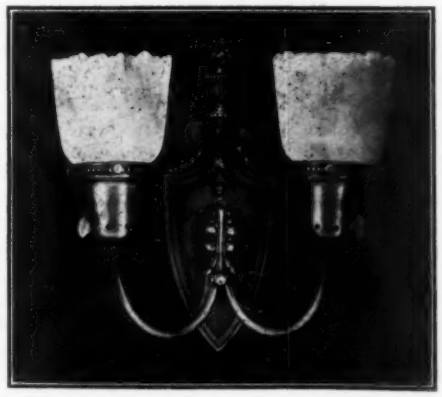
It is largely decorative, and the opportunities to follow precedent can be more easily complied with than with ceiling fixtures. The back plates can be made of a design in keeping with the form of artistic treatment, whether the lamps be gas or electric and either hang pendant or stand upright.

In gas lighting, the small upright burners are best adapted to artistic treatment, and the quantity of light is usually sufficient.



The designs shown illustrates the possibilities and effectiveness of such a unit.

In Figs. 1, 2 and 3, the main control cock or key is part of the design, while the light is controlled by the small electric key. In Fig. 4 only the electric key is used.



For planning lighting of new homes, or relighting old ones, educational work among architects, builders and consumers will be greatly facilitated if units such as these are displayed in the Gas Company showroom. In addition to the value of showing modern designs, opportunity is given to display standard finishes by having the fixtures finished in stained old brass, black and brass, nickel, antique silver, rich gilt, etc. A display of this kind is important, as it is one of the details that enhance the value of the aid in obtaining new customers and holding the lighting business for the *dependable* product—Gas.

Report of the Committee on Manufacturing, Iowa District Gas Association.

It was suggested that this committee give special attention to the following matters:

"Water Gas Machine Results in a Small Works."
"Different Kinds of Oxide."
"The Most Economical Way to Heat the Water in a Holder in a Small Plant to Prevent Freezing."

In regard to "Water Gas Machine Results," I would like to give some of the causes of not obtaining results and the remedies for them. In most smaller works the main reason for not obtaining satisfactory results in the manufacture of carburetted water gas, is that not enough attention is paid to the operation of the machine. The theoretic operation of a water gas machine would make gas, with as high a temperature as possible in the checker work without the formation of lampblack, and thereby obtain the greatest possible proportion of gaseous hydrocarbons. In practice we find factors entering the problem that limit the temperatures carried in the superheater, and it will be noted how narrow these limits are. Temperatures above 1,500° F. produce considerable lampblack in the superheater; a machine which carries 1,450° F. in the superheater would produce some lampblack, and would fill the works with naphthalene in a short time; one carrying 1,400° F. would give some naphthalene, but practically no lampblack; machines operating at from 1,300° F. to 1,350° F. produce hardly a trace of naphthalene in the plant; under 1,250° F. the machines show dirty sealpots, indicating tar and uncracked oils. The practical limitations in gas machine control are, then, complete decomposition of the heavier hydrocarbons and no serious trouble from the formation of naphthalene, i.e., clean seal pots and a minimum amount of naphthalene. Best practice keeps the temperature of the superheater within the rather narrow limits of 1,300° F. to 1,400° F., based on the use of gas oil having a gravity between 33° B. and 35° B. High heats at the top of the carburetter also tend to fuse the checker brick, and cause a slag to form which would create a great deal of back pressure and necessitate frequent recheckering. All water gas machines should be equipped with pyrometers, as the judgment of operators varies in determining the temperatures by color. It is also very important to use a good grade of coal or coke, and to maintain as deep a fuel bed in the generator as possible, so that the maximum amount of water gas will be produced. Results cannot be obtained from a low fuel bed, any more than they can in a coal gas bench, as practically the same action takes place. The fire should be cleaned at regular intervals; good results cannot be obtained on a dirty fire.

Standby loss can be eliminated, to a great extent, by operating the machine during the period that the most gas is being sent out. In order to determine this period it is suggested that log sheets be made showing the demand on the plant in particular seasons of the year. Readings should be taken every 30 minutes and continued for 24 hours, and from this it can easily be determined when to make gas. If the holder capacity is large enough to store gas through the days run to last over night, it would only be necessary to operate the machine during the day time, doing away with the necessity of starting up several times in the 24 hours and eliminating night running. It is also important to keep the generator closed up tight during a shut down as the loss in fuel is very great by leaving the ashpit door cracked, thus causing a draught through the machine during the shut down.

The gas in the relief holder should be removed as soon as possible to the storage holder to prevent the hydrocarbons from dropping out, especially in cold weather, and this can only be done if the condensing and scrubbing apparatus is of large enough capacity to insure the removal of tar before coming to the purifying boxes.

During the making of the gas, as also after it is made, every superintendent or foreman should know the quality of the gas, and this can only be obtained by a gas analysis apparatus and calorimeter. The smaller works' manager will say that the cost of the necessary apparatus is too great and that it adds an unnecessary duty to the already busy foreman; but it has been proven to me that the cost of this apparatus can be saved even in a medium sized works in a very short time. The writer recalls instances some years ago, when the candle power of the water gas went down without a sufficient change in temperature of the air to warrant the drop, orders would be given the operator to increase the amount of oil per run until the candle power came back to standard again. If a gas analysis apparatus had been available and an analysis made of the gas as it was manufactured, the cause

of the sudden drop in candle power could have been discovered, and the cost of the oil added would have been saved. It is practically impossible, with the present cost of labor and material and the constant demand by the public for lower gas rates and good service, to operate without this apparatus.

There have been many good papers on the subject of water gas tar, so the writer will not attempt to say very much on this subject, but would like to call attention to the fact that too much care cannot be taken with this by-product. It can cause a great deal of grief to the management if not properly stored, or left to overflow into the sewer systems or streams. I understand the government is taking steps to stop this practice, on account of the damage it causes to the hulls of boats. I know of one instance where the tar from a plant was allowed to flow into the river (in this case it happened to be coal tar), and being heavier than water, settled to the bottom. Some years later the city established a public bathing beach at this place, but the bathers soon discovered that the city had not made enough investigation before turning the beach over to the public. Each one returned to the shore with a good coat of tar, and bathing was discontinued. In conclusion, it is only possible through the use of pyrometers and gas analysis sets to give to the gas the refinements that are absolutely necessary to insure the delivery of a uniform quality to the distribution system, and to be sure that the cost of production is as low as can be, quality considered.

Different Kinds of Oxide.—About 1850, iron oxide was introduced for the removal of hydrogen sulphide from gas. Previous to that time what was known as the "dry lime" process being used. With the introduction of "iron oxide" or "iron sponge" lime was discontinued, and at present iron oxide is in almost universal use.

Iron oxide alone cannot be used for purification, as it would form a compact mass, through which gas could not pass. The materials most commonly used with the oxide, to form a sponge like mass, are wood shavings, ground corncobs or cork. A very good oxide is made as follows: To every bushel of shavings, or cobs, add 12 to 15 pounds of clean cast iron borings and one-eighth of a pound of salt. The shavings, or other material used, should be thoroughly saturated with water, the borings then spread over the top, and the salt added. It should then be turned at least six times by hand, or twice put through a mechanical mixer and twice turned by hand, water being used freely, and it can then be left to cure. It is very important that it is thoroughly cured, or in other words that the iron be entirely oxidized, as the CO in the gas will combine with free iron in the oxide to form iron carbonyl, which will be carried along with the gas, to be later decomposed by the heat at the burner. Here the iron deposits, clogging the burners. The best practice, when using oxide, is to have the clean box first in series, leaving the older boxes to catch the carbonyl, if by chance any iron is not thoroughly oxidized. Of late years natural mined oxides have been used with very good results.

The writer had intended to show in a tabulated way just what results were being obtained at a number of gas works throughout the district, and to obtain this information, sent out circular letters to members of the Association, asking for the information. Out of 18 letters sent, only 6 answers were returned, and it was impossible to get up this data in a table. From the replies received, however, it was very interesting to note the great variation in the amount of gas purified per bushel of new oxide, before it became necessary to change. At one plant it was only 4,000 cubic feet per bushel, at another plant, using the same kind of oxide, the purification was 100,000 cubic feet per bushel. I think it will be very interesting to hear a discussion on this particular point.

Oxide should not be discarded until it contains at least 60% of sulphur, but so-called spent oxides, in a majority of cases, do not contain more than half of this amount of sulphur, but have become inactive by being painted with tar. This is generally the case at water gas plants where condensing or scrubbing facilities are inadequate, and the gas reaches the purifying boxes with tar still in suspension.

The proper manner to determine what make of oxide to use at any plant in order to get the best possible purification, would be to keep an accurate record of the amount of gas purified per bushel between changes, as well as the total amount of gas purified during the life of the oxide. It does not follow that an oxide that gives best results at one plant would give maximum results at another plant, because of the wide variation in local conditions. Too little attention is paid to the purifying boxes of the average gas plant, because they usually cause so little trouble to the works foreman, but many poor-gas calls would be avoided if closer inspection were given the gas as it leaves the purifying house.

Heating Water in a Holder to Prevent Freezing.—The amount of waste heat that is practically a total loss in any water gas plant is enormous. There is no better way to prevent a holder from freezing than by using some of this waste to heat water and circulate it from the tank or pit through the heater or condenser back to the cups and tank. In a plant where water gas is not made continuously it would be necessary to provide steam syphons also. The plan of using the water from the holder tank for cooling in the water gas condenser, and at the same time heating the water in the holder tank, has been tried out successfully at the Davenport Gas Works. When using steam syphons, care should be taken that they are constructed properly. The idea of using a syphon is to get a good circulating movement in the water.

Determining Benzol in Gas Mixtures.

[From paper by G. A. BURRELL and I. W. ROBERTSON, Journal of Industrial and Engineering Chemistry.]

With the present great demand for benzol, and the installation of plants for obtaining this constituent, there has arisen a demand for a rapid method of determining the benzol content of gas mixtures. Here is a scheme that the authors have used in determining it in the carbureted mixed coal and water gas of Pittsburgh. Fig. 1 illustrates the apparatus. The bulb contains phosphorus pentoxide for removing water vapor. The apparatus is first connected to a vacuum pump and exhausted of its air. The gas mixture is then introduced at atmospheric pressure, the barometer read, and the two bulbs immersed in a freezing mixture of solid carbon dioxide and acetone or alcohol. After chilling about 10 minutes the gas is withdrawn from the bulbs by the vacuum pump. The gases removed will be those of high vapor pressure at—78° C. In the case of this mixed coal and water gas, these are CO_2, O_2, CO, H_2, CH_4, N_2, C_2H_4, C_2H_6, C_3H_6, C_3H_8 and C_4H_8; in fact, practically all the gas except the benzol. Next the stopcock on the apparatus is closed, the bulbs removed from cooling mixture, and the benzol allowed to vaporize at room temperature. Its pressure is then read on the side-arm mercury manometer. This pressure, compared with the atmospheric pressure, gives the percentage of benzol in the gas mixture. The results of two determinations are shown in Table I.

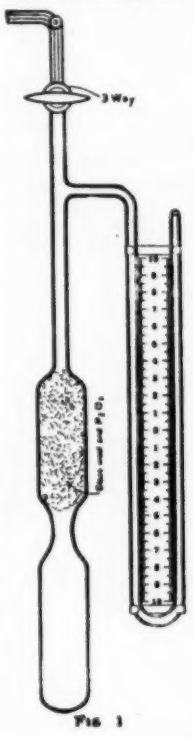


FIG. 1

TABLE I.—*Benzol Determination in Pittsburgh Gas.*

Sample No.	1.	2.
Original pressure of gas..	744 mm.	744 mm.
Partial pressure of benzol vapor	10 mm.	9 mm.
Percentage of benzol.....	$\frac{10 \times 100}{744} = 1.34$	$\frac{9 \times 100}{744} = 1.31$

To obtain other data on this method of separation, the distillate from the above freezing was passed into fuming suphuric acid. In the case of Sample No. 1, 7.32% of illuminants was obtained, and in No. 2, 7.39%. The total illuminants in this Pittsburgh gas, by absorption in fuming sulphuric acid, is 8.67%. In other words, the benzol percentages as found, added to 7.32 and 7.39, respectively equal 8.66 and 8.70%, almost identically the same as the total illuminants in the gas.

Benzene reacts with oxygen as follows:

$$C_6H_6 + 7.5\ O_2 = 6CO_2 + 3H_2O.$$

The contraction is 2.5 volumes and the carbon dioxide is 6 volumes. Table II. shows the analysis of the residual vapor held in the liquefaction bulb when the original gas was cooled to—78° C. Before analyses the benzol was diluted with air.

It will be observed that the ratio of the carbon dioxide to the contraction is almost exactly 6 : 2.5, showing that the vapor obtained in the benzol determination was principally benzol. Traces of other easily condensible vapors may have been present, but apparently in such small quantities as to be negligible.

The authors were unable to find, in the literature, the vapor pressure of benzol at—78° C., but apparently it is very small. Benzol boils at 80.12° C.; at—20° the vapor pressure is 5.76 mm. according to Regnault. The authors prepared saturated vapors of benzol by shaking the pure liquid with air. It was a simple matter to prepare unsaturated vapor by merely diluting the saturated vapor with air. The percentage of benzol was checked by combustion analysis. It was found that all of the benzol could be separated at—78° C.

TABLE II.—*Analysis of Benzol Vapor.*

	Cc.
Volume taken for analysis	28.29
Oxygen added	51.94
Total volume	80.23
Volume after burning	75.47
Contraction due to burning	4.76
Volume after KOH absorption	64.25
Carbon dioxide produced by burning	11.42

The above tests show that as far as the Pittsburgh gas is concerned the method is satisfactory.

In extracting benzol from coke oven gases the gas is washed with a petroleum distillate, in which the benzol is dissolved with the toluol and some other products. As a check on the efficiency of the scrubbing apparatus there is needed a rapid test for the benzol, ete. In this case, toluol or other easily condensible hydrocarbons would interfere with the test, as the vapor pressure of toluol is only 0.0058 mm. at—78° C. The best one could do, would be to estimate them together, along with any other vapors that might also be retained, so that the test would give the efficiency of absorption in the scrubbing oil of all the easily condensible vapors. The authors have made no experiments with coke oven gas.

Report of the Committee on "New Business," Iowa District Gas Association.

It was suggested that this Committee report on the following subjects:

"Modern Kitchen Devices."
"Hot Water Heating Devices."
"The Field for Industrial Fuel Gas in Small Cities."
"The Present Apparent Possibilities of Increasing Gas Sales by House Heating."
"Increasing Residence Lighting."

In looking over the catalogue of manufacturers of gas ranges and other gas burning appliances for use in the kitchen, and examining the ranges of various kinds that we have had the opportunity to inspect, we find a marked improvement in style, finish and quality of material. Plainness, less ornamentation in the castings, enamel pans, door panels and splasher panels, all tend to the attractiveness and utility of the modern gas range. Flash lighters, which during the past year have been developed and perfected in several styles, have proved very serviceable and satisfactory, and add to the attractiveness and desirability of the range from the purchaser's point of view. The type of burner used on the standard makes of ranges, appears to have reached the limit of efficiency, but we anticipate that in the near future a burner will be designed which will give better service and utilize more heat units per cubic foot of gas consumed, Cabinet ranges are replacing single and double oven ranges, and campaigns have been conducted by quite a few gas companies on this style of range, with satisfactory results.

Gas iron campaigns have proved very profitable business, and the irons on the market at present give very good satisfaction to the user, and boosts the sale of gas.

Water stills, which the makers guarantee to give absolutely pure water, very desirable for drinking purposes, are being placed on the market by several manufacturers.

Garbage incinerators are frequently placed in the kitchen, and while they are probably not so much in demand in small cities as in the larger cities, there will be an interesting demand for them as the public becomes educated in their use.

Hot water heating by gas is now the rule in all modern homes, and is a source of very profitable business to the companies, as a large percentage of this consumption comes during the off peak period. They are installed not only in residences, but also in barber shops, doctors' and dentists' offices and for industrial purposes. Gas water heaters have been perfected for all purposes; Instantaneous Automatic Heaters, from the small one and one-half gallon heater that can be installed in the office, kitchen or bath room, to the large storage heater for the largest homes or office buildings; tank heaters for barber shops, and other places where a continuous supply of hot water in small quantities is necessary, to the larger coil heaters with thermostat attachment to take care of places where an abundant supply of hot water is required.

The field for industrial fuel gas in small cities is considerable, but has not been thoroughly covered, and is well worthy the attention of the gas companies who have a new business department. A complete list of prospective users of gas is given in the book entitled "A Thousand Uses for Gas," issued by the National Commercial Gas Association. In it users of gas industrially are classified, with the various purposes for which they could use gas fuel. Some of the prospects for gas consumption along this line in every small city include bakers, candy makers, barber shops, garages, vulcanizing shops, blacksmiths, tinshops restaurants, butchers, cleaning establishments, newspaper and other printers, harness makers, shoe repairers, hotels, tailors, laundries and machine shops. This is not a complete list, but just a few places where gas appliances can be used to advantage.

Referring to the present apparent possibilities of increasing gas sales for house heating; we do not find that at the present cost of manufacturing and distributing artificial gas in small cities any type of burner or heater has been developed that will compete with coal. There have been some experiments along this line, and somebody sooner or later will solve the problem, and a large field will be opened up for increased sales of gas.

There has been considerable improvement in the design and construction of portable gas heaters during the past years, eliminating, to a great extent, the unpleasant odors from burnt and partially consumed gases, which will tend to make these heaters more popular.

Increasing Residence Lighting.—To get all the business possible in this line requires very careful attention of the new business department. A close tab on all new residences should be kept, in order that the advantages of piping for gas light can be brought to the attention of the architect and the owner.

The co-operation of the manufacturers of fixtures, in designing fixtures that will meet the modern ideas of artistic and efficient illumination of the home, is of great importance, and will help more to increase the sale of gas for lighting than anything the gas company can do or say. The manufacturers of gas lights should also give their assistance by developing and manufacturing burners that will be suited to the various styles of fixtures needed to equip the modern home.

Campaigns for the sale of gas lights in houses where older styles of fixtures are in use, has brought increased sales of gas in many cities. This has been carried still further in some cases, and campaigns for the sale of fixtures and lights have proved successful.

Constant advertising of gas as an illuminant is necessary, not only in the local newspapers, but also by a liberal display of lights and fixtures in the gas office, not only hanging on the ceiling and wall, but in use every evening, so that the public can see and judge for themselves the value of gas as a light for their homes.

Natural Gas Quality.

The U. S. Bureau of Mines has issued Technical Paper 109, which deals with the chemical and physical properties of the natural gas used in twenty-five cities in the United States, giving the first comparative data of the kind ever published. The authors, G. A. Burrell and G. G. Oberfell say:

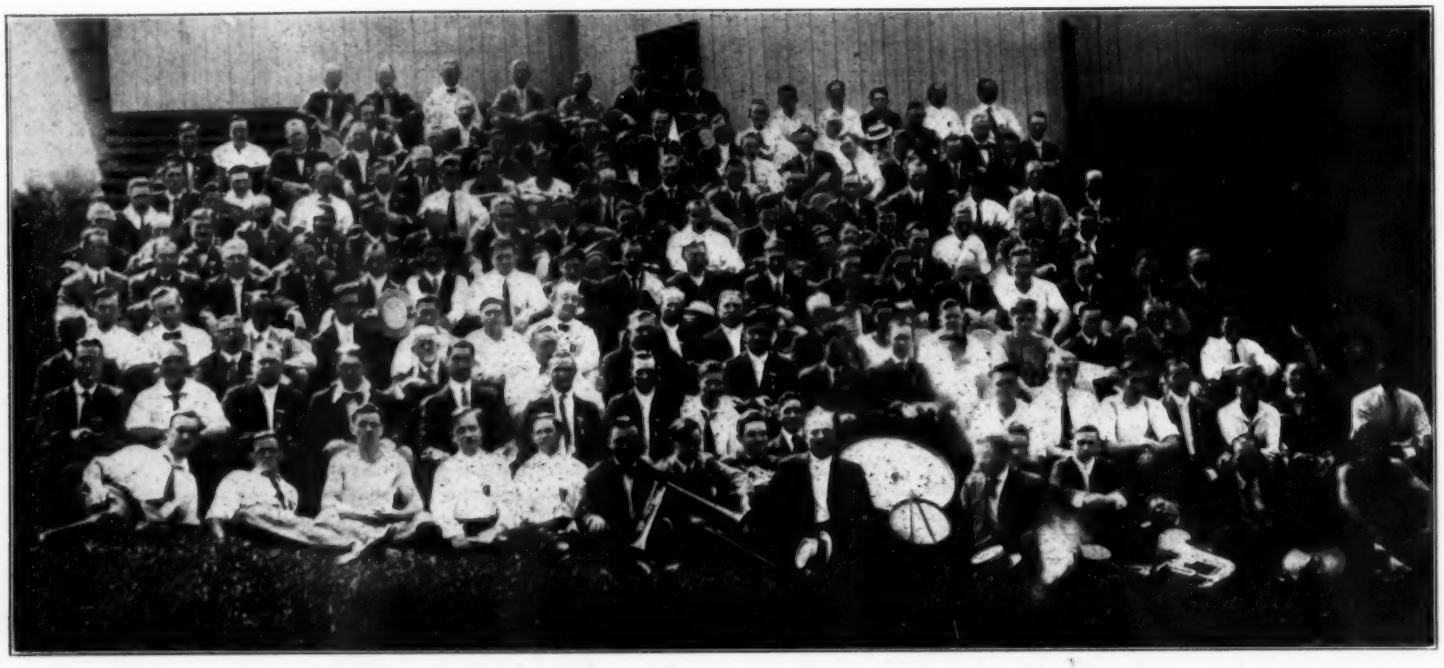
"The composition of the natural gas from twenty-five cities in the United States is shown. Five of the samples contain only methane as the combustible gas. The others contain in addition to methane, higher members of the series of paraffin hydrocarbons. The heating values range from 735 to 1312 B. T. U. per cubic foot at 0° C. and 760 mm. pressure. Natural gas in two different sands of the same field may vary materially in composition.

"The natural gas used in Pittsburgh, Columbus, Cleveland, Cincinnati and other places in the East is quite alike in composition.

"The explosive limits of mixtures of natural gas and air lie between about 5% gas, low limit, and 11.50% gas, high limit. For many of the natural gases listed, there is required about 10 cubic feet of air, per cubic foot of gas, for complete combustion.

"It requires a very large volume of natural gas to suffocate a man. The effect on small animals, like canaries, of mixtures of natural gas and air is principally due to the lowering of the oxygen content of the air by the diluting action of the gas.

Brooklyn's Commercial Outing.



"Eat, drink and be merry" was the slogan of the men of the Commercial Department of the Brooklyn (N. Y.) Union Gas Company, on Saturday, August 14, at their first annual clam bake and field day. Promptly at noon Chairman C. I. Hodgson got the boys together at 130 Atlantic avenue, where they boarded 3 Rubbernecks and 7 Flivvers; there being over 150 in the party, to say nothing of the band. After a drive of 15 miles to Witzel Grove everyone got the dust off and out, and the sports began. Judges Korthaus, Gerlich and Miller decided that the shoe race was the most exciting; the fat man's race the fastest; the ball game the noisest, and the bowling the hottest. The winners were as follows: Hundred yard dash, Johnson; three-legged race, Crump and Searfoss; shoe race, Geo. Balduf; one mile run, Johnson; fat men's race, A. Daly; one mile relay, Roach, Noll, Nolan and Silke; baseball, married men, 4 to 2; bowling, first, Barry; second, Bower; special events, J. P. Conroy and S. Tully Willson; lucky numbers, "Pop" Mason and Wm. Cushing.

The prizes were donated by Mr. T. M. Ambler, The General Gas Light Company, the Welsbach Company and Bayley and Sons. After the battles, and even before all of the belligerents had gotten their wind, time was called for the "Bake," and those who have attended these filling functions will see from the menu that the days slogan was realized:

Clam Broth		Soft and Hard Clams
Sheepshead	Sea Bass	Potatoes
Lobsters	Crabs	Tripe
	Sweet Potatoes	
Spring Chicken	Asparagus or Corn	
Watermelon	Ice Cream	Coffee

A feature of the outing that will stand as a record hereabouts is that of attendance; everyone in the department, excepting those who had to remain on duty, was present. This was accomplished by having each employee contribute 15 cents a week toward his ticket, the result being that a rather expensive outing was enjoyed without financial embarrassment.

The Gas Float.

A safe and sane 4th was celebrated at Mt. Vernon, N. Y., the principle event being a parade, in which the Westchester Lighting Company participated with two floats, displaying appliances for using the company's products—one gas and one electric.

The gas float shown in the accompanying illustration was a result of efforts of Mr. J. W. Green, superintendent of the Mt. Vernon branch of the company.

Briquetting Coke Breeze,

In the *Journal fur Gasbeleuchtung*, Herr Behr, Manager of the Gas and Water Works at Kolberg, tells of experiments made during the past 6 years on the briquetting of coke breeze, and describes the plant built as the result of the experiments at the Kolberg gas works. He says in part:

"Burning coke breeze in gas works under boilers, either with or without admixture of tar, necessitates suitable grates, blowers, etc. The flues rapidly choke, and much unconsumed breeze is lost, owing to the blast. The use of coke breeze in proper suction producers leaves little to be desired as regards economy, but there are not sufficient of these plants to utilize much of the breeze, and in many cases local conditions preclude their use. The briquetting process that gave the best results, compressed the breeze after adding finely divided hard pitch and heating the mass to 300° to 400° C. Experiments with both thin and thick tar, with an addition of sawdust and coal dust as binders failed as regards ease of ignition.

"In using the briquettes a $2\frac{1}{2}''$ by $2\frac{1}{2}''$ size is best where the layer of fuel is not less than 8 to 10 inches. Good chimney draught is necessary, such as is required for ordinary 2-inch coke. The best results, however, are obtained in closed iron stoves, central heating plants, etc., in which 50 to 100% of the fuel ordinarily used can be replaced by coke briquettes.

"When the coke briquettes were first introduced, about 6 years ago, they did not give satisfaction, as they were made 4 inches in diameter, and were not as hard as the later ones. When the smaller $2\frac{1}{2}$-inch briquettes were introduced, householders took kindly to them, and now at times the demand exceeds the output.

Modern Commercial Distribution.

[A paper read before the Southwestern Electric and Gas Association.]

There was a time—thousands of years ago—when "*service*," as we understand the term, did not exist.

Originally the consumer was on earth alone. He became a producer, not through choice, but through necessity. He was a producer solely to supply his own needs, and he consumed his own output. He went without articles that he lacked the industry and ingenuity to produce. Each community lived by itself, with little in common with other gatherings of individuals. The conditions under which each and all lived were identical—same soil, same climate, no advantage in wealth of one over the other. Yet, in spite of the fact that all were seemingly on an equal footing, it was observed that some men, with no other aids than natural qualifications, could so far excel others at a certain task as to warrant them in giving it all their time. Naturally, as time passed, each man felt a disposition to do fewer of the tasks at which he was least skillful, and more of those at which he excelled. This resulted in some tilling the earth, others shepherding the flocks, and some fashioning rude tools and weapons for others to use; thus the birth of "specialization," which made for efficiency. Each gave unto his neighbors enough of the fruits of his labor to obtain such of their products as he required. That was the beginning of what is now called Commerce.

Remember, this was before wealth existed. There wasn't any surplus of anything to constitute wealth. Hunger and cold were the only spurs to productive labor. If that work which he could do best was the fashioning of weapons or tools, or shepherding the flocks, or tilling the earth, he then specialized in a specific duty, thereby ceasing to do all of his own producing. As each individual essayed a lesser variety of tasks he became more and more dependent upon others for portions of his necessities. Naturally, doing only that which his abilities best fitted him to do, resulted in each man having an excess of some commodity. To obtain other necessities he went to his neighbor, who was in the same relative position, and exchanged part of his surplus for a portion of his neighbor's, because each needed some of what the other had and each had an excess of that which he produced.

It came to pass that certain members of the community gave more and more of their time to Exchange, thereby becoming exceedingly proficient, until eventually all their attention could be given over to expediting "Exchange and Service." So we find commerce had its inception in the desire to set each man at the task for which he was best qualified. Commerce, then, didn't evolve from a desire to accumulate wealth through barter and exchange You can see that mankind only sought lines of least resistance in dealing with problems of existence. They soon learned that the measure of man's value was his ability to *serve* his fellowmen. As the population increased and overran the earth, discovering new climates, new soils and new bounties of Nature, commerce grew from exchange of service between individuals, to exchange of service between communities, and then to exchange of service between widely separated countries and nations. To-day you see the wonderful commercial fabric—the outgrowth of that small, simple beginning.

Let us discuss briefly that part of the broad field of Economics that has a direct bearing on the subject in hand.

From the public viewpoint, Business, as commerce is generally known, is carried on to minister to the needs of a community, a people of many nations. From the individual viewpoint, business represents a livelihood—or, as Hubbard says:

"Business is a matter of earning a living. While we are earning a living we are living a life." When earning a living, you work—you are performing a service for someone. When "in business" you are either managing or helping to manage an institution to do service for many.

We, of course, understand that all who take any part in construction service are producers, but for convenience we will consider:

Production.—The making of goods or form of service for distribution.

Distribution.—The getting of goods or service from where they are to where they ought to be.

It is much easier to manufacture—produce—than to sell the product—distribute. Scientific management was first applied to production because wastes are more apparent and results readily reckoned. Then, too, production elements are definite elements, as compared with distribution. Hugh Chalmers tells us that business men deal with 5 "M's"—Money, Material, Machinery, Merchandise and Men. Production has to do with all five elements, but more particularly with the first four. Distribution principally with the last named—*men*. If you wish to double your output, add the equipment and your increase is practically assured. If you wish to double your sales, adding twice the organization you now have will, as likely as not, add to your expense, cut down your profits and leave you worse off than before. The biggest problem in business to-day is *men!* Because of that, distribution, merchandising—all that has to do with human nature—is the big problem. It is present in our industry, perhaps more so than in others, because we have four natural divisions, and, unfortunately, each branch hasn't always been in harmony with the others.

These divisions are:

First.—The utilities—the central station—whose prime duty it is to make connection and supply energy to the places of utility, made ready by the contractor, with materials supplied by the jobber and make by the manufacturer; the electric railway—whose function it is to provide adequate transportation; the telephone and telegraph companies, whose office it is to provide satisfactory means of communication between people in nearby or widely separated places; the gas company, whose task it is to satisfactorily supply gas for all the purposes for which gas may be used.

Second.—The manufacturer, whose aim it is to develop and manufacture apparatus and supplies required to give greatest service and satisfaction.

Third.—The jobber, who gathers from manufacturing sources the thousands of kinds of apparatus and supplies, and concentrates them under one roof convenient to their ultimate users.

Fourth.—The contractor, who draws upon the jobbers' stocks for all the sundry items needed to equip the houses, buildings and other forms of utility, to make ready for the energy furnished by the central station or gas company.

Each should loyally support the other, because if each performs well the part that he should be best fitted to do, each will be indispensable to the others.

Utilities.—The utilities are the foundation of the industry that supplies public utilities, and their customers. If the utilities are commercially sick, the balance of the industry suffers. If the utilities cannot make extensions, or use equipment, or increase service or product, the contractor has no work and can sell no material, the jobber receives no demand from the contractor and, therefore, can give no orders to the manufacturer. We, of the manufacturing, jobbing and contracting lines, who sell direct or indirectly to the consumer, sometimes fail to realize that the consumer's needs, his orders and his purchases, depehd almost absolutely on the business success of the utilities—the railway, the central stations, the gas works. If the central stations are making no extensions in either their supply system, or in the number of their customers, or the use by those customers of their service or product, then those customers are buying little or nothing in connection with the different utilities' service. Many of the contractors, and some even of the jobbers and manufacturers, do not realize this fact. They seem to think that the business derived directly from the consumer or customer is entirely independent of, and has no relation whatever to the utilities themselves; but, as I have shown, the more profitable the business and the greater the demand from the utilities themselves for new materials and apparatus, the greater will be the sales to the individual public who are patrons of these utilities. It is, therefore, decidedly "good business" for the contractor, the jobber and the manufacturer to work for the success of the interurbans, the city railways, the central stations and the gas companies, for anything which injures the profit or well being of the utilities lessens the demands on the manufacturer, the jobber and the contractor for their goods—not only the demand that comes from the utilities themselves, but the demand that comes from the public for the goods that they use. I desire to lay especial emphasis on this point because I know there are some in the supply business who do not realize this fundamental fact as fully as they should; and who not only feel independent of the utilities, but are not always friendly toward them and do not work for their interests.

Manufacturer.—The manufacturer takes Nature's materials and fabricates and assembles them for distribution. His entire policy must be premised on a "*customer and quality first*" basis or he can't live. Competitive conditions to-day are such that a successful factory must live up to that slogan to the letter. Nowadays delivering only finished product is not sufficient; you must give a boost—a plus with each. The growth of "guarantees" and the

(*Continued on page 138.*)

THE AMERICAN GAS LIGHT JOURNAL

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Electrolysis.

The orders of the Manitoba Public Utilities Commission, in the matter of electrolysis mitigation in Winnepeg, lay down reasonable rules covering the construction and maintenance of electric railways using their tracks for carrying return. This seems to us the clearest setting out of what is incumbent upon such companies that has yet appeared; and it is gratifying to note that they are based on examination and recommendations made by Professor A. F. Ganz, of Stevens Institute of Technology, whose first work on this subject was undertaken for the American Gas Light Association in 1905, and reported upon at the first meeting of the Gas Institute in Chicago in 1906. Professor Ganz has devoted considerable time to the study of electrolysis since then, and is an acknowleged authority in such matters.

Safety Competition Among Employees.

An article in this week's JOURNAL emphasizes the necessity of getting the employee personally interested in accident prevention; and it is interesting to note the way this is being done by one utility company.

The Pensacola (Fla.) Electric Company is encouraging its street-railway employees in the lessening of accidents due to carelessness, by conducting a "safety first" competition. The motormen and conductors are grouped into two teams, each in charge of a captain, and compete for a period of two months in the prevention of accidents. At the end of this time the winning team is banqueted by the company at a prominent hotel, when the officials have an opportunity of coming into closer contact with the men.

In order to determine which team has the better standing, all accidents of the two months are rated in points. The more serious accidents and those where carelessness is the controlling factor, are rated highest, at from 50 to 100 points. For the accidents where others than employess are to blame, but few points are counted against the team. Every accident is penalized and rated at a certain value, depending on the possibility of preventing it. To discourage a crew from failing to report an accident in order to save a penalty, the highest penalty of all is attached to a suppressed report.

A "safety committee," composed of the superintendent, claim agent, one inspector and two team captains, passes on all accidents. This committee meets every Monday and reviews the accidents of the previous week, rates the penalties to each, and then posts bulletins that show the team scores, with suggestions for accident prevention.

An officer of the company is quoted as saying: "The effect of this competition has been to give the men a spirit of rivalry, and we are convinced that careless accidents have been greatly reduced. The men have the principles of 'safety first' instilled in their minds to a point where it is their first thought."

Such a plan has possibilities for all large corporations.

International Gas Congress.

Preparations have been made to welcome gas men from all over the world at the International Gas Congress at San Francisco, September 27 to October 1. It will be the biggest convention of gas men ever held, due to its wide representation and because of the attraction of the Panama-Pacific International Exposition. The president of the Congress is Dr. Alexander C. Humphreys, and Geo. G. Ramsdell, secretary of the American Gas Institute, is its secretary. Mr. E. C. Jones, president of the American Gas Institute and of the Pacific Coast Gas Association, has called annual meetings of both of these organizations during the week of the congress, and several others, including the National Commercial Gas Association, the Illinois Gas Association, and the Natural Gas Association of America, will also hold meetings at this time.

Announcement, Canadian Gas Association.

The Eighth Annual Meeting of the Canadian Gas Association will be held in Montreal, Quebec, on Thursday and Friday, September 16th and 17th. Headquarters will be at the Windsor Hotel, where ample accommodations are available for all visitors.

The morning of the 16th will be given over to a business session, and the presentation of some very interesting papers that have been prepared for the occasion.

On the afternoon of the 16th there will be a trip to the new Lasalle Gas Works, which should be of special interest to all gas men, as the new plant has been pronounced by many engineers one of the most up-to-date on the continent. Preparations have been made for the entertainment of the ladies by a trip up the mountain and through the parks.

On the evening of the 16th, there will be a theatre party for the ladies, and a smoker for the men.

The morning of the 17th will be devoted to the presentation of papers and final business; and at the conclusion of the session, members, visitors and ladies will be taken to the Golf Club for luncheon.

The Canadian Gas Association extends a very cordial invitation to all the gas men of Canada and the United States to be present, and it is hoped that there may be many visitors to the city.

The officials of the Association are, Howard E. Mann, President; and John Keiller, Secretary-Treasurer.

Michigan Gas Association Meeting.

The 24th annual meeting of the Michigan Gas Association will be held in Detroit on September 23 and 24. The members, and any other gas men that can make it convenient to attend, are urged to get to Detroit early on the evening of the 22d, as an entertainment is planned for that night, and only two days will be given to the sessions, instead of three.

The list of papers already arranged for is as follows:

"High Pressure Distribution for Small Plants," by Ralph B. Wagner.

"Recent Developments in the Doherty Washer-Cooler and Condenser Systems," by R. B. Rowley of the Semet-Solvay Company.

"House Maintenance of Gas Lighting," by Wm. O. Weeks,

"A Talk on Accident Prevention," by Chas. B. Scott.

"A Talk on the Welfare and Training of Employees," by C. L. Palmer of Detroit.

Then there will be a contribution from Professor Alfred H. White and his assistants at the University of Michigan, who are in charge of the experimental and research work carried on by the Michigan Gas Association through its Fellowships. This is always of value and interest to everybody in the gas business.

The banquet will probably be on the evening of the 23rd, and some unusually interesting speakers and other entertainment has been arranged.

Further details can be had from Glenn R. Chamberlain, Secretary, Grand Rapids, Mich.

SPECIAL ENGLISH CORRESPONDENCE.

Monthly Letter From Norton H. Humphrys, Salisbury, England.

GAS BUSINESS IN LONDON UNDER WAR CONDITIONS.—PARLIAMENTARY LIMITATION OF THE PRICE OF COAL.—GAS AT A WAR PREMIUM.

The Metropolitan Gas Companies, always first in the field, have issued to the shareholders the usual financial statements showing the result of operations during the first half of the current year. After the exciting events that have occurred during that period, in regard to supplies of material and labor, one is surprised to find the directors report and statement are of the usual unsensational character that, in case of shareholders not otherwise specially interested, facilitates a direct journey to the waste paper basket. The figures go to show that, with the aid of statistics accumulated as each year is completed, it is possible, to a large extent, to forecast altered conditions in expenditure quite 6 months ahead, and to meet such contingencies with a minimum of discomfort or inconvenience either to consumers or shareholders. As much may be concluded from the fact that the profit actually earned, shows a degree of approximation to the sum required for the payment af the statutory dividends, that is something more than a mere coincidence. The astute shareholder will not fail to note the point as being conducive to the security of his dividends.

Increased selling prices for gas are, of course, an all round necessity. With many classes of skilled labor, and the prices of metals of all kinds, advanced anything up to 50% we cannot expect otherwise. The Gas Light and Coke Company charge 6d., the South Metropolitan Gas Company, 8d., and the Commercial Gas Company (who have not been hit so badly in the matter of coal freightage as their neighbors), 4d. per 1,000 cubic feet more, as compared with a year ago. All the undertakings being subject to the operations of the sliding scale, these advances mean a loss of dividend to the shareholders, to the extent of ½ to 1% on the investment, which is a big slice out of the total of 5 to 6%. In the case of the Gas Light and Coke Company alone, it means nearly £65,000 for the 6 months. As already noted, these profits have been actually earned, and there is no occasion for further drafts on the already somewhat depleted balances of accumulated profit. Notwithstanding moderate additions to the number of gas consumers, and to the appliances let on hire, there is a decrease in the total quantity of gas consumed, to the extent of about 4%, brought about by Government restrictions on outside lighting, both as regards public thoroughfares, and places of business and amusement. Time was when London had character of being the dingiest, worst lighted metropolis in Europe. This has ceased to be the case for many years, and those whose business or pleasure carries them to London three or four times in the course of the twelvemonth, and who are thus afforded opportunity for comparing the lighting of 1913–14, with that now obtaining, will agree with the conclusion that without some compensating increase of consumption in other directions, the decrease would have been very much more marked. The Gas Light and Coke Company show a reduction on the actual cost of coal, due to diminished tonnage not only on account of the smaller output of gas, but to the use of a larger proportion of fluid hydrocarbons. Also they had large deliveries under old contracts, and these causes went against the large increase in freightage. The C. W. G. apparatus has been responsible for one-third of the total production. Gas making materials on the whole have cost, per 1,000 cubic feet of gas made, about the same, but there has been some loss on residuals. Comparing the cost of oil and coke, with that of coal less receipts for residuals, at current prices in each case, there is no question as to which is, under existing circumstances, the cheaper means of putting the gas into the holder, apart from other advantages. The C.W. G. apparatus saved the situation in many gas works during the past winter, and the manager who has ample provision in that department of his plant, is likely to have a happier Christmas season of 1915–6, than the one who holds exclusively to coal gas. In times of scarcity of labor, it is easier to send out a properly purified gas when the crude product contains about 120 grains sulphuretted hydrogen per 100 cubic feet, than when there is four or five times as much of that impurity to be removed. The South Metropolitan Gas Company supplies straight coal gas entirely, and while their tonnage of coal remains about even, the price has gone up 25%. They have recovered about one-third of the increase in the shape of larger receipts for coke, the other residuals being as before, so the net increase is in the neighborhood of 17%. Although many gas undertakings throughout the country have to face an enormous increase in retort house wages, of about 30%, the London companies show, if anything, a slight decrease, probably due to the fact that the retort house operations are conducted entirely by machinery, and to the introduction of vertical retorts. An all round reduction in the stocks of coke and breeze is a notable feature, for which the London Coke Sales' Committee, and the C. W. G. plant are entitled to share the credit.

After an amount of delay that would be characterized as inexplicable in any case other than that of the Government, a Price of Coal Limitation Act has been passed by Parliament. A period of nine months has been found necessary to enable His Majesty's advisers to find out that the venders of coal, speaking generally, have been charging their customers a higher price than is fairly warranted by the increased costs of putting coal on the bank, brought about by and due to circumstances created by the war. And having recognized this injustice, they propose to legalize and perpetuate it over the next three months. The limitation is not to come into force until three months after the passing of the Act, which will be about the 1st of November, so coal owners have plenty of time to make a large haul by artificial manipulation of the laws of supply and demand, and it is to remain in force until six months after the closing of the war. Every inducement will be made, or perhaps it would be more correct to say, continue to be made, to create a feeling of blackest and most dismal foreboding as to the prospects of getting coal during the winter. The miner, who appears to be a sort of combined automaton and puppet that dances according to the way the string is pulled, but in addition occasionally throws in a few flourishes off his own bat that neither his employers or his real masters (the miner's union) can control or account for, will be called upon to assist. Many gas companies found themselves in the unfortunate possession of empty coal stores early in the spring, and placed their contracts not only with a view of covering the summer requirements, but of providing a stock that would be considered wise and reasonable under the present circumstances. They are to be indirectly penalized for exercising any wise foresight of this description.

Half a loaf is better than no bread, and the regulations in respect to which the word "limitation" may be read in more than one sense, are preferable to none at all. The Act is remarkable for its extremely cautious, not to say apologetic tone towards the coal trade. Parliamentary control and regulation of selling price is no new thing, and it is difficult to see why similar regulations to those considered necessary in the case of gas, water and electricity, should not also apply to coal, and any other commodity in connection with which it is possible to circumvent the operations of free competition. The special feature in regard to the supply of gas is that the seller is, or rather was, supposed to have a monopoly, and this gives a precedent for legal regulation in respect to any commodity that is, or can be made into a monopoly, either by the operation of natural laws or by artificial means of the character known as "rigging the market." The legal control of selling prices dates back much farther than is generally supposed. Some 500 years ago, in the city of Salisbury, which at that time ranked fourth in the Kingdom in respect to population, very stringent regulations were in force as to the number of loaves of bread to be made from a bushel of flour, etc., and a defaulting baker, instead of being let off with a fine, was put in the pillary and decorated with a few of the offending loaves attached to his person. There are to-day to be seen some remains of a building that was at one time the corporation brewery. Disgusted with the attempts to regulate the quality of the beer, the city fathers decided to protect the public by brewing the genuine article under their own control. Education was not so advanced, but stricter ideas as to fair and just profits in trade were more prevalent at that time, and anything in the way of selling at exorbitant profit was then called by its proper name. Yet the Government have not found the limitation of the price of coal a congenial task. Either they object to an extension of the price regulation, or they are afraid of the coal trade. So much is evident from the half-hearted character of the bill.

The measure is retrospective in one respect, but that not in regard to the main feature of the price to be paid. It applies to contracts entered into subsequently to April 1st, 1915, and therefore practically covers all the current contracts for coal, as made by gas

undertakings, but this concession is nullified to a great extent by the fact that it does not affect the coal supplied previously to Nov. 1st. An important defect in the Act is that the "Standard" price named in it, is indefinite, variable and open to dispute. It is defined as 4s. per ton more than "the price of coal of the same description, sold in smaller quantities, and under similar conditions, affecting the sale at the pits mouth at the same coal mine, on the corresponding date, or as near thereto as may be practicable, in the 12 months ended June 30th, 1914." This definition appears to leave room for considerable disagreement, and to necessitate an adjustment of price in respect to each consignment. One can understand, in the case of a gas undertaking, the contract price, as extending over 6 or 12 months, as being a definite figure that cannot be disputed. But the first necessity for the application of the Price Limitation Act, will be an agreed price schedule covering the period in question, and when that is decided, the onus of proving that all the conditions are exactly similar is a very heavy one for the purchasers, who, in many cases, know nothing of the colliery from which their supplies are furnished. Really it seems that obtaining relief in respect to the price of coal, under the Limitation Act, will be as difficult as getting a refund for a misdirected telegram.

The Grantham Gas Company have devised on original method for increasing their income, without following the general precedeht of raising the price of gas. The directors report that the increased price of coal and materials of all kinds, and the decreased value of tar and ammonical liquor, must be met by a proportional increase of income. As possibly the increased cost of coal would only be of a temporary nature, they do not propose to raise the price of gas, but to charge, in lieu thereof, temporarily, a war premium to the extent of 10% on the gas accounts, to take effect as from the 1st of October. We have it on the authority of Shakespeare that "a rose by any other name would smell as sweet," and similarly a higher price for gas, in whatever form it may be put, does not lose its character. A consumer in Grantham, paying 2s. 9d. per 1,000 cubic feet, and 10% war premium in addition, will be in exacty the same boat as a consumer in another town who pays a straight rise of 10% on the present price. Presumably there are slot meters in Grantham, and the inspector who has the task of collecting 10% on the sum found in the till, from consumers on this system, is not to be envied. The general rise in the price of gas is not directly necessitated because the country is at war, but because prices of material and labor have gone up, whether as a partial or complete consequence of the war does not matter. Further, the war premium may be expected to end simultaneously with the war, but one is not justified in concluding that the same will be the case with regard to abnormal prices of material and labor. There will be contracts for coal and other material to be worked out, and the probability is that many will not live to see a full recovery of the normal commercial conditions. The only recommendation that can be used on behalf of the war premium, is that it is a cheap appeal for Patriotism, which would be quite appropriate if the sum obtained by this means was applied to purposes connected with the war. That an increased price is necessary, is obvious to any fair minded customer, and I have not heard of objection being raised, even in a single instance. But at a time when prices of all kinds of necessities are being raised, there is nothing of a patriotic nature connected with a higher price, direct or indirect, in the gas bill.

Russian Gas and Politics.

(From Our Own Correspondent.)

PETROGRAD, July 18th, 1915.

A remarkable dispute has taken place in Petrograd which has ended in a still more remarkable interim dénouement. The private gas company of the town has been laying mains along various streets for the purpose of supplying private consumers, particularly workshops. But as the town council held the monopoly for supplying gas to such clients, it felt compelled to call upon the private company to cease its operations in that direction. The matter was taken into court, which judged in favor of the corporation, so that the private company will be obliged to remove the pipes it had already laid down. This was a serious matter for a number of French shareholders in the company, and the intervention of the French Ambassador was solicited. He pointed out that under existing circumstances it would be unfortunate to cause any feeling at all, even in the limited business circles of Paris and Petrograd. It is stated the judgment will be held up until a more convenient season.

(*Continued from page 135.*)

Modern Commercial Distribution.

imperative necessity of *under*stating the performing powers of manufactured products in order to be safe and keep the expense of making good the guarantee down to a reasonable figure, has developed an ethical standard among manufacturers that 20 years ago did not exist. Most manufacturers to-day are constructive, helpful elements in the industry. The few who are *not* can't live very long.

Supply Jobber.—The supply jobber is an economic necessity. He performs a service to manufacturer, utility and contractor that can't be duplicated at anything like the price that the manufacturer pays him. The constant effort on the part of utilities and contractors to force the prices of utility commodities down, and the rising cost of giving good service, makes the jobber's lot a difficult one. Take a list of your yearly purchases and estimate the cost to you of securing your needs from the manufacturers scattered all over the United States and Europe—compare such action with the convenience and saving in *time, effort and money* made at present and due entirely to the jobbers' stocks and service, and the question of whether or not you need the jobber, will answer itself—*you do need him!*

The Contractor.—The contractor has been the least popular member of the four comprising tbe broad public utility family. Up to a few years ago the contractor wasn't grounded in good business practice, and as a credit risk he often wasn't any too desirable; hence he was an inefficient member of the group. The natural law of elimination—removing the unfit—operated in due course, and to-day utility contractors, as a class, are able, capable business men.

Each and every branch of the utility industry—whether the utilities, manufacturer, jobber or contractor—must co-operate with the others to broaden the markets for all things needed by the utilities and their customers. The eloctrical branch has taken for its "slogan," "All together, all the time, for everything electrical!" I don't know whether the gas branch has a slogan, "All together, all the time, for everything gassy!" or not, but they understand co-operation just the same—which is the main point. Why is it so essential that this be done? Because competition in a broad sense means waste, while co-operation results in economy—efficiency. The energy spent in friction among ourselves lessens our ability to compete with our markets.

To get from our markets adequate returns, we use two tremendous forces—salesmanship and advertising.

Salesmanship is making the other fellow feel as you do about the goods or service you are selling—to sell profitably *you* must be "sold," and you must sell goods and service to customers who will continuously use increasingly larger quantities of your product.

Advertising is anything that informs others of the existence of something that was previously unknown to them, or that afterwards redirects their attention to it.

The relation between advertising and salesmanship is very close; it is closer than a team in a yoke; it is closer than friends; it is closer than brothers—yes, it is closer than man and wife, because there never can be separation or divorce. Advertising is salesmanship and salesmanship is advertising, but there is this difference: Advertising is salesmanship plus publicity, while salesmanship is advertising plus getting the order signed. To use salesmanship and advertising effectively we must have:

1. *Health.*—A sick man can't do really good work. Most of us are paid to have good livers, but unfortunateiy some have bad ones. Needless to say, it is each man's duty to be as physically fit as possible.

2. *Knowledge.*—One needs to have a good working knowledge of his line. Classify your knowledge, and have it ready when needed. If you can't remember it all, have your data where you can get it instantly. Many a man has built up a big reputation whose greatest asset was his ability to get any information needed just when he wanted it.

3. *Systematic Industry.*—Keeping everlastingly at it. There is a great deal in favor of keeping on, *keeping on*. Continued work means the steady delivery of "base hits," as compared with the occasional "home runs." The "base hits" are much more vital, because you can only build up a profitable business on many single, comparitively small orders. Your steady customers are the ones who pay stock or partnership dividends.

4. *Honesty.*—When a man is not honest in saying what he will or can do, he is not giving himself a square deal. When a man

overstates the qualities or the performing ability of his goods or form of service, he is not giving his goods or service a square deal. When a man does either of these things in trying to convince a prospect, he is not giving the prospect a square deal. In every case of lack of honesty he is violating natural laws. One can't violate Nature's laws and not pay the penalty. The man who isn't honest and sincere is foolish. You can only get a square deal from a "square dealer." Every sane man knows that honesty isn't the best policy, but that it is the *only policy* to adopt and persistently and consistently carry out.

5. *Enthusiasm.*—This is the quality that lends fire to your eye and convincing power to the tones of your voice. The greatest accomplishments of the world owe their fullfillment to that quality. You can't successfully feign enthusiasm, because it is built upon too firm a basis. It requires strong belief, premised on honest conviction, resting on thorough knowledge. The hardest man to whip is the enthusiastic chap, because he will not recogonize *defeat* when he meets it.

When we are all well equipped personally, the next important success element needed is the correct viewpoint. All business has as a bedrock foundation, somebody's need of goods or service. When we supply that need we are *serving the user*, hence the expression, "*service viewpoint.*" When you buy a railroad ticket what do you get? A piece of pasteboard or a strip of paper. Is that what you paid for? Of course not! You paid to be transported from one place to another. When you buy an electric percolator you get a nickelplated copper urn with a heating element. Is it the thing of metal that you want? No! You wanted a converter, and that is what you bought. Ground, roasted coffee beans and water, put through a converter, result in a beverage that is delicious. The percolator is a means to an end—it serves you. Everything you buy is bought on a *service basis.* You *yourself* are holding your position because of what you can do—not because of what you weigh or wear. *It is what you think, know and can do that determines what you receive.* Your employer or your stockholders keeps you at the head of your division or company, because you give them service in the sense of foresight, efficient knowledge, square dealing and concrete results that should include satisfied customers, as well as contented stock and bond holders. The cultivation of the fundamental right *service viewpoint* results in courteous and "human" handling of your new and old customers. It is the essence of the "Public Be Blessed" spirit.

Advertising and salesmaship are used—goods or service are sold in three ways:

1. Word-of-mouth.
2. Pictures and illustrations.
3. Printed matter.

Face-to-face or telephone conversations are word-of-mouth appeals. Cartoons, pictures of all kinds, illustrations, plans, window displays, blue-prints—in fact, anything that is visualized in form, to be readily apprehended, comes within the second division. Catalogues, folders, bulletins, booklets, telegrams, letters—all forms of other than word-of-mouth appeal—are printed matter.

The effectiveness of any one or all three ways of advertising and selling—distributing—depends upon the selling motives that actuate the buyer, as well as the plant behind the talk or copy. All the buying motives used since commerce came into existence can be classed under one or more divisions. Every successful salesman, merchandiser or distributor who ever lived used those motives, consciously or unconsciouly. Let us apply them to some distributing problems.

Why does a manufacturer use an electric instead of shaft drive? Because it is less expensive—*gain of money.*

Why does a woman buy an electric or gas iron when it costs more originally and to operate than the old-fashioned sad iron heated by wood or coal? Because of its utility—continuous ironing, no trudging back and forth, no heating up of the room—gain of utility.

Why do you buy protective devices in connection with your plants and lines, etc.? Because you want to prevent accidents—satisfaction of caution.

Why is the Safety First movement so appealing to everybody? Because it is a stirring, strong and vivid appeal to one's sense of self-preservation—satisfaction of caution.

Why does a woman often buy a handsome percolator or chafing dish, and place it on the sideboard where it isn't used twice a year? Vanity—desire to have the best and latest devices regardless of need—satisfaction of pride.

Why does your prosperous consumer buy $175.00 worth of apparatus, appliances or fixtures when he could equip his home completely for $45.00? Because he wants the best—wants their appearance to harmonize with his other expensive furnishings—satisfaction of pride.

Why do many people still cling to kerosene oil when electric or gas lighting is more convenient, efficient and better? It is easier to stick to habit—to retain the old than to throw it out and install the new—self-indulgence or weakness.

In word-of-mouth salesmanship and advertising it is very important that your "size-up" of the prospect be accurate. Time doesn't permit of my going into that feature. There is a definite science of character analysis and it is, of course, evident that the more one knows of it—the better a man knows his fellowmen—the more effective he is and the greater his success.

I hope I have given sufficient information in this necessarily brief paper to interest each of you to dig down to *principles of operation* rather than to be content with methods not always well based. As surely as we are all here to-day, men who *know*—men who are thoroughly familiar with fundamental *reasons why*—are the ones who will be the successful leaders of to-morrow.

Accident Prevention.

[From Address by CHARLES B. SCOTT to the Southwestern Electrical and Gas Association.]

Before I enter upon the discussion of the subject, I might refer to some of the organizations working in the interests of safety, with which I am connected. The National Electric Light Association has heen giving particular attention to accident prevention, and I know of no National employers' organization that has accomplished more in this work. There is a National Safety Council with headquarters in Chicago, which devotes its particular attention to stimulating a sentiment in favor of greater safety among the smaller employers of labor. Its literature is of greatest value, and any of you desiring literature to assist you in carrying on the work of accident prevention, would do well to become members of the National Safety Council. There is also a National Conference Board on Safety and Sanitation, composed of representatives of the National Manufacturers' Association, the National Metal Trades' Association, the National Founders' Association, and the National Electric Light Association; which is giving its attention to the standardization of safety devices and appliances. One of its greatest accomplishments is the perfection of an ideal first-aid jar, and standard safety and danger signs.

The Bureau of Safety, with which I am directly connected, was originally organized for the safety work of certain public utility interests having headquarters in Chicago. After some two years devoted to the work of these particular companies, the bureau was incorporated, and is now giving its services to any employer of labor needing expert counsel and advice.

It is particularly appropriate that the electric people should give this subject such attention. We know that electricity is really a factor of safety. The electric light is safer than the portable oil lamp; electricity as power is safer than any other form of power used. Public service companies should give it special attention, because no other business comes so close to the people as theirs, through its service. In this way public service companies are a great factor in shaping the minds of the public and influencing it in matters of general public interest.

I am speaking of safety to-day as a matter of general concern, a social rather than an industrial problem, which is a matter that should have the interest and attention of citizens generally, rather than the special interest of the man who employs labor.

When the industries first turned their attention to accident prevention, they were amazed at the incomplete and not-very-well authenticated statistics brought to them. They discovered that in one year about 40,000 fatal accidents occurred to workmen in this country, and that two million were injured while engaged in industrial occupations; and that the economic loss from fatal injuries and of these less serious, amounted to more than four hundred million dollars per year. It would be interesting to know the total number of accidents that occur in this country, including industrial accidents; and I venture to say that it will be found that more accidents occur in the ordinary domestic pursuits of life, during the everyday life of the people, than in the industries of the country. Whenever these facts are developed, public attention will be directed to the prevention of those accidents, and that is the most important field of accident prevention.

The fact that 40,000 workmen each year lose their lives, and that 2,000,000 are injured, presents to the employer the idea of an

economic loss that directly affects him; but the matter of the destitution, the deprivation and dependency, the impairment of ability to earn a living, does not so much concern the employer as it does us as citizens, and society in general. These results are the phase of this safety problem, that should and will enlist general public attention, because it imposes a burden on the public that we as tax payers and citizens are compelled to bear. Thus it becomes a social problem.

Our government has been active in the conservation of its natural resources, but only recently has it awakened to the importance of the conservation of the lives and limbs of its citizens.

One of the things which impressed the industries was the discovery that only about 15% of accidents to workingmen were caused by physical hazards or mechanical conditions. It has been developed that 85% occur because of the failure of the human element. There are more employees injured in the electrical industry by others dropping an insulator, a pair of pliers, or a crossarm from the top of a pole than by electric current in making a tie. There are more injuries on account of defective ladders and such common causes, than from electric current. Accident prevention to those in the electric light business, the electric railway business, or the gas business, is not so much the question of the hazards of the industry, as of taking care of those causes which contribute to accidents in every industry, by securing the interest and the personal caution of the individual. The employee is decidedly the most important factor in accident prevention. When it comes to public safety, the most important factor is not traffic rules, nor safe installation of equipment and safe construction, but the interest of the individual. I care not how hard you try to make your properties fool-proof, how much attention you give to safeguarding of your machinery, or to the insulation of your apparatus, until you fully appreciate that the first essential is the man on the job, and secure his co-operation, you will make very little advancement in the matter of accident prevention.

The workingman has only to be convinced that he is the interested party upon whom you depend, to enlist his co-operation and interest in the work. Industrial accident prevention concerns the employee, and instead of the management taking the initiative in this work and being responsible for carrying it on, the employee himself should take the initiative, and should carry on the work with what assistance he can get from the employer. It concerns him far more vitally than it concerns you, who are responsible for management of the properties. If you will bring this thought to the employee, impress him that it means more to him than it does to you, remind him that if he loses his ability to earn a living he becomes a bankrupt, that his family is dependent upon him and his ability to provide for them; you will enlist his co-operation and his interest as you cannot in any other manner.

I would not leave the impression that it is not important that you take care of mechanical conditions; that is the first duty of the employer, and shows that he is willing to do his part, and is sincere in asking for the co-operation of his employees; and although it eliminates only about 15% of the number of accidents, it is essential that it should be given proper attention. The workman should be impressed with the fact that he also owes a duty not to himself alone, but to his fellow-workmen and to the public; and when you have so impressed him, you will find him the greatest factor in accident prevention.

Safety work cannot be carried on by either the employer or by the public in a spectacular way. Safety in the industries must receive the same common sense, practical attention, that your other business activities receive. It must not be made a matter of entertainments, displays, buttons and signs, but must be a part of the business of your company, and the workmen must recognize that accident prevention and safety are just as much his business as are the other activities of the company.

As a proof of what can be done by sane, safe, practical safety methods, I refer you to Brooklyn, N. Y. This city has a population largely foreign, and noted for the large number of children they have. A few years ago there were so many fatal injuries to school children on the streets that the Brooklyn Rapid Transit Company took up the question. They put a woman in the public schools to instruct the children how to take care of themselves, looking upon that as the most effective way to eliminate these accidents. This woman organized safety patrols in each of the schools, consisting of five or six children, with some bright boy or girl as the captain of the patrol, to serve for about a month. It was the duty of the safety patrol to go to school a little earlier than the other children and assist the little tots across the streets so that they would not be hurt by passing automobiles and street cars. So it was made a matter of public education and public co-operation, and the number of accidents of that kind were very materially reduced.

The Northwestern Railroad Company has made, perhaps, the most remarkable record of any transportation company in the matter of accident prevention. Their success was due to the fact that every man working for the company is a part of their safety organization. I can best show you this by saying that in 1912–1913 9,772 suggestions for safety were received by the company from its workmen. More remarkable is the fact that only 387 of these suggestions were rejected, That is the kind of co-operation, the kind of sensible sane work that proves effective in accident prevention, because it enlists the interests of the entire organization. As a result of these efforts, in the four years ending June 30, 1914, the Northwestern Railroad Company had 137 fewer employees killed than in the preceding four years; that there were 9,150 fewer injured, and 813 fewer passengers were killed.

Practical safety work of this kind, where you secure the co-operation and the interest of the individual, is the real and only kind of safety work, whether applied to industrial corporations, or public safety. Instead of being a matter to be considered by such conventions as this, and particularly by public utility companies, it will be a matter in which the public generally will be interested; and it will be found that the principles I have tried to bring out as being most important in industrial safety, will be true of public safety, and the co-operation of the individual will be found absolutely essential.

In Chicago there are each year 3,500 accidental deaths, 12% of which are children. Each year 75 babies are scalded to death because the mother, in her thoughtlessness, leaves boiling water where the child can pull it over, or fall into it. In this country 30,000 trespassers are killed each year; 6,000 of them men going to and from their work, and 1,000 of them children. It is apparent that this is a question for the public, not for those engaged in industrial pursuits. The public must take up this question if this great sacrifice is to be prevented.

The economic feature of accident prevention and safety work is not the thing that appeals to us. A work of love, of humanity, work for the welfare and happiness of others, is what will endure. The payment of our contribution to the welfare and happiness of our fellowmen is just as important as the payment of our debts of dollars and cents. I believe that the accumulation of riches, of good deeds, riches of doing something for our fellowmen riches contributing to their happiness and welfare, are more important and more enduring than the laying up of dollars and cents.

San Francisco's Finest Weather in the Fall Months.

With the summer season in full swing, and the advent of tens of thousands of visitors, the Panama-Pacific International Exposition presents a scene of unrivalled activity and splendor.

Notable men in every branch of endeavor are thronging to the city of palaces at the Golden Gate, and their verdict is that nowhere in the world are assembled such monumental architectural marvels as those at San Francisco. The record attendance during the opening days has been followed by still greater attendance in the summer, and many thousands are preparing for the journey during the Fall.

Of all periods in which to visit San Francisco, the season between August and the closing of the Fair on December 4 is the most attractive. The weather during these months is equable, and the charm of the Indian summer lingers long after that period has passed in the Eastern States.

Up to the first of August, 9,350,000 persons had passed through the Exposition turnstiles. The income from admissions from February 20th to July 11th amounted to $1,568,126.80; the receipts from concessions was $676,810.02; the miscellaneous income was $775,337.40. The gross income since the opening on February 20th until July 11th was $3,020,274 22.

With the advent of August, the number of special parties and conventions is greatly augmented, while individual travel from remote sections is unprecedented. For the first time in their lives thousands of Americans are crossing the Rockies.

The vast exhibit palaces, which contain more than four hundred thousand displays garnered from all portions of the globe, are eagerly inspected by visitors; and thousands are registered in the imposing state buildings. From the thundering Palace of Machinery with its giant engines, pumping plants, dynamos and printing presses in action; through the vast Palace of Transportation where

the earliest types of locomotives contrast with the great mogul engines of the present day, where sections of large ocean liners are seen in contrast with tiny models; into the great Palace of Agriculture where threshing machines, harvesting machines, reapers, and sowers are seen in operation; into the Palace of Food Products, where closely packed throngs watch every step in the preparation of edibles; and into the other palaces, an amazed and delighted throng daily progresses. Wherever practicable, machinery is shown in operation, and all steps in the processes of production are illustrated.

A feature pleasing to the many thousands is that active measures are taken for their entertainment. There are upon the grounds no less than 54 moving picture shows, wherein are daily displayed, without charge, well selected and attractive scenes, revealing the activities of the various states and countries. Lectures accompany many of these displays, and the visitor is enabled to enjoy scenes from Argentine, China, Japan, the Philipines, the Netherlands, Cuba, Sweden and 43 other lands, while cinematographs of important works, such as the Panama Canal, the New York State Lock Canal, the manufactories of the great corporations of the United States also are displayed without charge.

Many famous musicians are constantly reaching San Francisco. Band concerts, recitals on the great pipe organ in Festival Hall or on the pipe organ in the Illinois Building, or that of the United States Steel Corporation in the Palace of Mines, serve to rest visitors after a tour of the palaces and grounds. Folk singers and musicians, including the trained singers from Hawaii, the Hampton Jubilee Singers from the Southern States, the Mormon Choir, the Marimba Band in the Guatemala Pavilion, the strange chants of the Maorians in the Maori Village, and the war songs of the Samoan Islanders, serve to instruct and entertain. Hundreds of open air meetings are weekly held upon the grounds, and the sound of ringing salvos and loud cheering echoing through the courts and over the vast exhibit palaces is often heard. The brilliance of the full dress uniforms of many nations, the blare of the brass bands, the glitter of epaulets and the thousands of men in the uniform of trades of the fraternal societies of the United States Army or militia, contribute to the inspiring spectacles.

The free pyrotechnics at night, part of the spectacular illumination of the Exposition, draw thousands of visitors to the marina upon the shore of San Francisco harbor. Here thunder and lightning are simulated with a vividly realistic effect and a giant battery of forty-eight search light projectors with 2,600,000,000-candle power, throw shafts of colored light upon great jets of steam or clouds of smoke liberated high in the heavens. Their brilliant shafts are visible at a distance of 60 miles from the Exposition grounds.

Many social functions are weekly held in the State buildings and national pavilions. Dancing, recitals, banquets, luncheons and other gatherings constantly reunite friends and acquaintances from distant lands. Giant parades and pageants are of almost daily occurrence, and scores of important conventions meet every week either in Festival Hall upon the Exposition grounds or in the auditorium at the Civic Center. A constant series of sports events, marine events, music recitals and receptions are staged. Each of the States and Nations holds open receptions, and many important personages including governors of States, senators, diplomats, dignitaries, captains of industry, leaders in art and science, are constantly reaching San Francisco, while hundreds of special trains are thronging to the Golden Gate city bearing delegates from all parts of tho United States. In every State building visitors from the home State are registering, and as many as 7,000 names were registered from one State in a single week.

The grounds of the Exposition were never more attractive than at present. From now until its close the vast swards of green, the many acres of flowers in riotous fields of color, the palms and pines from distant portions of the globe will be seen in vivid contrast with the lofty spires, colonnades, domes and turrets of the Exposition city.

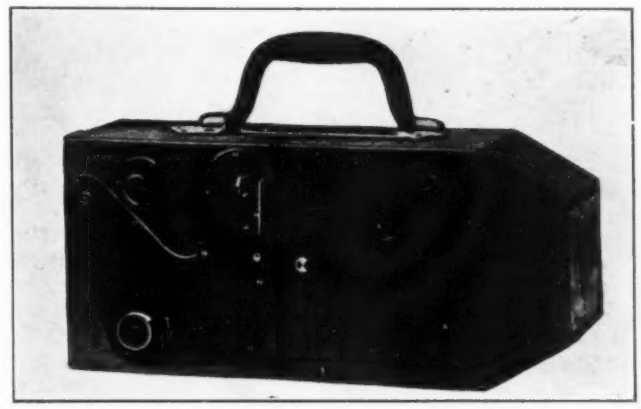
September is the month to go. The International Gas Congress meets on the 27th.

Dye Works Organized.

The works at Chester, Conn., where aniline dyes are being made by a secret process, are to be operated by the Middlesex Chemical Co., organized last week with $250,000 preferred stock and $250,000 common. The company recently turned out the first pure carbolic acid crystals ever obtained in this country, which is of tremendous importance to the dye and acid trade. Heretofore the plant has been worked by a group of men headed by John T. Hetterick, without legal organization.

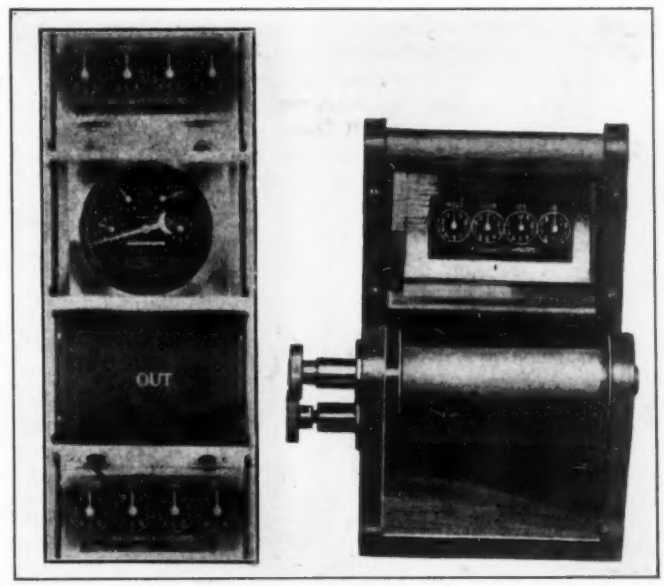
New Methods and Appliances.

CAMERA FOR READING METERS.—A special camera has been developed by the Folmer and Schwing division of the Eastman Kodak Company, Rochester, N. Y., for the use of meter readers, who can thus bring to the office at the close of the day's work photographic



Electric Lighted Camera for Recording Meter Readings.

records of the dial pointers on the meters of the customers visited. To "take" the reading he simply holds the camera opening against the dial glass and presses a lever, which automatically opens the shutter for a definite period, and at the same time lights four small battery-operated lamps to illuminate the dial. After each exposure the shutter is locked and cannot be operated again until the film roll has been advanced for the next picture. The device can also be used as a flash lamp in dark passage ways by pressing the lever part of the way down, without operating the shutter.



A Film and Stand for Examining Readings.

A roll of film is sufficient for seventy-five exposures and costs 25 cents. Two additional rolls can be carried inside the camera box, making a total of 225. The film consists of an emulsion on opaque paper, backed up with a white coating that makes the image on the developed film show clearly, although reversed right and left, mirror fashion. The developed film is examined by mounting the rolls in a stand and reading the reflection in a mirror. As the customers name and meter number are marked on each dial, the photograph leaves no doubt of the identity of the reading. If the customer is "out," the meterman notes this fact on a card and photographs it for his record.

The "Factograf" camera, as it is called, provides a definite photographic record of the condition of the customer's meter and avoids all possibility of misreading or future controversies. Such evidence, it is pointed out, is especially useful in the case of maximum-demand meters, where, ordinarily, the meter reader notes the position of maximum-demand pointer and then sets it back to zero, thus destroying all record of its position.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE annual meeting of the Empire State Gas and Electric Association will be held in the United Engineering Society Building, New York City, on Thursday and Friday, October 7th and 8th. The program for the meeting will be announced later.

A MOVE is on foot to establish a gas plant in Terrell, Tex. The Terrell Commercial Club is working on the plans, which, if carried out, will result in a plant to be owned in part by local people.

A SECOND gas company has petitioned the selectmen of Mansfield Mass., for a franchise, and the matter is under careful investigation and consideration by the board and town council.

THE controlling interest of the Freehold (N.J.) Gas Light Company has been sold to the Standard Gas Company of Atlantic Highlands. It is understood that there will be no change in the officers or management of the company. A plan is under way to run a pipe line from Matawan, the western terminus of the Standard Company's line, to Freehold, to supply people living along the line with gas, and also as a precautionary measure against accidents, as it will enable the company to supply gas from the other plant should either one break down.

THE Pittsburgh Water Heater Company have won a suit for infringement against the Beler Water Heater Company. The Court of Appeals has upheld the Shook patent, and gives the Pittsburgh Water Heater Company the exclusive right to manufacture a heater having a positive acting single gas valve operating under dual control of thermostat and water valve, described in that patent. This decision reverses the finding of the U. S. District Court, and was arrived at after a complete survey of prior art and the evidence of experts. In announcing its victory, the Pittsburgh Company says: "It is not our intention to in any way intimidate, or encroach upon the free choice or good will of either the trade or users, but we consider it our duty to present the facts."

MR. M. L. KANE, connected with the U. G. I. Company, of Philadelphia, and its associated companies, for the past eight years, has been appointed General Manager of the Brandon Gas and Power Company, Ltd., of Brandon, Manitoba, Canada.

AT the first annual outing of the Lawrence (Mass.) Gas Company Employes Association, at Hannagan's Grove, Canobie Lake, a ball game was played between the married and single men, resulting in a win for the Benedicts by the score of 16 to 5. Following the game, dinner was served, and then the following entertainment programme was presented, with Leroy S. Colby as chairman: Selection, Gas Company Orchestra; Remarks, President Daniel J. DeCourcy; Song, William Riley; Remarks, C. J. R. Humphryes, vice-president and agent of the company; exhibition on parallel bars, William J. Halloran and company of the Y. M. C. A.; song, John F. Murphy; dialect stories, Joseph Hines; tumbling act, Simms brothers; song, H. T. Tremblay; dancing specialties, M. Greavey and Griffiths, Eugene Murphy; Star Spangled Banner, Orchestra. After the entertainment the usual list of sports was run off and resulted as follows: Hand blind throwing contest, won by Patrick Callahan; hop-step-jump, won by Daniel Casey; shoe race, George O'Reilly; 3-legged race, Thomas Morrissey and George McDermott; ball throwing, won by Jeremiah O'Leary; sack race, Timothy Kane; 75-yard dash, Walter Adams; 75-yard dash (fat men), David Stevens; 60-yard dash, Ray Brennan. Several tugs-of-war followed, after which the base ball team from the shop administered a whitewash to the team from the works by a score of 9 to 0. The festivities closed shortly before 6 o'clock and the men boarded cars for home after spending an enjoyable day.

THE Southern Connecticut Light and Power Company will soon be receiving its supply of gas from the Springfield (Mass.) Gas Light Company to light Thompsonville and immediate vicinity. The supply at present is received from Hartford through a pipe line of nearly 24 miles, being the second longest artificial gas pipe line in the country, it is said. The selectmen of Longmeadow have granted permission to the Springfield company to run a high-pressure line through the streets of that town to connect at the state line with the Connecticut line, which has already been built.

SIMPLEX Gas Plants Company has been incorporated in Oklahoma City; capital stock $125,000. The incorporators are J. S. Wakefield, Oklahoma City, and L. J. Halliburton and O. G. Halliburton, Dallas) Tex.

JOHN H. BONNELL has contracted with the Grand Rapids (Mich.) Gas Light Company for the laying of an 8" gas main to Bonnell, over a mile from the old Masonic home property on the Clinton road, service to be ready by Jan. 1.

A LOCAL paper says: "Henry Johnson, an efficient expert in the employ of the Wisconsin Public Service Company, has been in Sheboygan for a couple of weeks laboring to increase the quality and quantity of the output of the producing plant of the Sheboygan Gas Light Company. Mr. Johnson is a gas man with a national reputation, and is accomplishing his mission."

THE Kalamazoo, Mich., city council has adopted the form of ballot providing for an issue of $975,000 of bonds to acquire a municipal gas plant. It will be submitted to the voters at a special election on September 7. Our correspondent says: "In the ballot, no mention is made of the charges to be made by the city for gas. An impression has prevailed that the city will not charge to exceed 75 cents per 1,000 cubic feet, but the city is reserving the right to charge the gas consumer whatever they wish, which may be even more than is at present imposed. One city official stated that he was of the opinion that for 4 or 5 years at least, the city would be unable to charge less for gas than is now being charged, and it is generally understood that members of the council are of the opinion that 85 cents is the lowest possible price the city can charge, and meet running expenses and bond interests."

THE City Gas Department, Richmond, Va., has installed an exhibition of gas consuming devices in the Chamber of Commerce building, offering the people of Richmond, opportunity to learn all there is to know about the economical use of gas. On the second floor, gas ranges of every conceivable shape and size, have been installed and connected, and experts show visitors how to cook, and at the same time how to keep the gas bill down. Heating apparatus, from the little bathroom heater to a furnace large enough to heat a home, may be seen in operation on the third floor. Gas incinerators for destroying garbage are on exhibition on this floor. On the fourth floor, lighting fixtures are shown, and visitors may see everything in the lighting line, from the simple wall jet to a magnificent dome.

THE Bessemer, Ala,, council has passed the amended franchise asked for by the Bessemer Gas Company, under which it proposes to supply coke oven gas. The company agrees to give to the city 20,000 cubic feet of gas a month for an indefinite time.

A WAR between rival gas companies in Frankfort, Ky., is promised, the Kentucky Public Service Company having announced its intention of tapping the line of the Byllesby interests, which furnishes gas to Louisville, at a point 5 miles from Frankfort, on the Lawrenceburg pike, and piping it into Frankfort. The pipe is on the ground, and the work will commence as soon as a franchise over the Lawrenceburg pike is granted by the Fiscal Court. Application for a franchise was made at a recent meeting of the court and granted, and upon that action a contract with the Byllesby interests was consumated, and the euuipment for constructing the spur into Frankfort purchased. Subsequently it was learned that the Fiscal Court, on the same day that the franchise was granted, for some reason reconsidered its vote, and rescinded the action.

LAKE CHARLES (La.) at last is certain of a gas plant. The City Commission has awarded a franchise, subject to confirmation by the taxpayers at a special election to be held the middle of September, to James C. Fessler and George E. Boyle, who will begin to install a $100,000 plant as soon as the people of Lake Charles confirm the action of the commission. Mr. Fessler filed bond for $10,000 a minute after the council voted to accept the offer. He says, barring accidents, they will begin to furnish gas by January 1, 1916.

NOTICE has been served upon the city by the Manitowoc (Wis.) Gas Company, that it will hold the city and contractor responsible for damage caused the company pipes by the digging for the sewers. The communication says that the company had considered enjoining the work on the sewer, but realizihg that the work would be delayed, and other improvements held up, it had decided not to take that course. The gas company has had two breaks in its mains, and it has interfered with service to some of the company's patrons in the west side district and caused much trouble and inconvenience. It is said that changes made in the line of the sewer will compel the company to take up its mains while the work is being laid at Franklin and Sixteenth street, causing additional losses.

FOR fear of possible accidents, the Rochester (N.Y.) Railway and Light Company has, for several months, been covering its pipes with re-inforced concrete where they run through or are exposed in the underground conduit system. In some of the downtown streets, the sewers, mains for water and gas, and other underground piping, make it impracticable in many cases to run electric subways through without crossing some pipes. In such cases the workmen have left the pipe as it was and built the manhole around it, bending the cables so as to avoid it.

AT the annual meeting of the stockholders of the New Bedford (Mass.) Gas and Edison Light Company, Thomas F. Glennon was elected a director, to succeed the late George R. Stetson. All of the other directors were re-elected, and Charles R. Price was re-elected treasurer and clerk of the company. The complete board is: Charles R. Price, Frederic Taber, Oliver Prescott, John S. Perry, Henry M. Knowles, Lot B. Bates, Parkman M. Lund, Frank H. Gifford, William H. Pitman, Clarence A Cook, Thomas F. Glennon.

THE Old Colony Gas Company officials have been corresponding with the officials of the Whitman (Mass.) Board of Trade relative to the introduction of a number of group gas lights at the business center. The company asserts that it can show good results, and is anxious that the people should have an opportunity of inspecting their system of street lighting before making a contract with any other company. They offer to put in sample lights for a limited length of time, so that the people may have a chance to compare them with the electric lights now in use.

THE People's Gas and Electric Company, Chillicothe, Mo., has sold its electric plant to the city, and it will be combined with the present municipal plant. The People's Company will continue to operate its gas plant.

THE Lansing Fuel and Gas Company has laid a new 10" gas main across Grand river, from Moores Park to the north side of the river near the power company dam. This completes a $7,000 construction job begun in June.

E. G. COWDERY, of Chicago, was re-elected president of the Beloit Water, Gas and Electric Company at the annual stockholders' meeting.

MINOT, N. D., has granted a gas franchise to Robert E. Barron, Samuel J. LaDue and Halvor L. Halvorson. The franchise provides that three miles of mains must be laid by November 25, 1916. On the passage of the franchise ordinance the company agrees to put up a bond of $1,000, which is to be forfeited by the city if work is not commenced in two years. The maximum price is fixed at $1.75 per thousand feet. When the consumption reaches ten million feet per year, in the city, it is to be reduced to $1.65; when it reaches twenty million feet the price is to be reduced to $1.60; when it reaches thirty million the price is fixed at $1.50. The city is to have gas for lighting the streets at $1.40, and all the city buildings are to be lighted free.

THE Public Service Company of Northern Illinois is installing a bench of ¾ depth 9's at their Pontiac, Illinois Station. The Gas Machinery Company, of Cleveland, O., who have the contract for this work, will furnish their standard bench with silica retorts and settings.

THE stock control of the Consumers Gas Company, Princeton, Ind., has been purchased by Fred. W. Freese, of Fort Wayne. The plant is to be remodeled and put in first class condition

UTILITIES COMMISSION NEWS.

CENTRAL HUDSON GAS AND ELECTRIC IMPROVEMENTS.—The Public Service Commission, Second District, New York, has authorized an issue of $500,000 of bonds by the Central Hudson Gas and Electric Company, the proceeds to be expended for extensions and improvements to its plant in Poughkeepsie, Newburgh and surrounding territory. The bonds will be 10-year 6%, in $1,000, $500 and $100 denominations, convertible into common stock on and after October 1, 1918. An issue of stock to meet conversion demand is also authorized. $58,000 will be expended in improvements to the buildings in Poughkeepsie, $175,000 for a new side track and new machinery at the electric station, $20,000 on the distribution system in and about Poughkeepsie, including underground street lighting circuits and an extension of the lines to Pleasant Valley, and improvements in the machinery at the Poughkeepsie gas plant. In Newburgh the expenditures provided for, include a concrete roof for the electric station, and several thousand dollars for new cables and machines. The transmission systems will be extended from Marlborough to Cedarcliff, from Walden to Maybrook, and from Caldwell to Cold Spring. Nearly a mile of 10" gas main will be laid in Newburgh from the gas works to Robinson avenue, and to Broadway, and a 7,500 foot extension will be made to Windsor Terrace.

ST. JOSEPH, MO., INCREASE POSTPONED.—The directors of the St. Joseph Gas Company have decided to continue the rate of 40 cents per 1,000 cubic feet for natural gas for two months after the order of the State Public Service Commission, suspending operation of the company's proposed advance to 60 cents per 1,000 cubic feet, expires Sept. 1. This will have the effect of delaying the proposed 60-cent rate until Nov. 1, in order to give the Commission an opportunity to dispose of the proceeding in which the city is seeking to prevent the rate increase before the rate is actually advanced. The company could legally enforce the increased rate beginning Sept. 1, if it so desired, since the Public Service Commission, which had already granted two suspension orders, has refused to again suspend operation of the proposed schedule. The Commission pointed out that the only way in which the higher rate could be held up would be for the company to enter involuntarily into such an agreement.

DISCHARGE OF HOT WATER INTO STREAMS.—Although the owner of an industrial plant situated on a river bank is entitled to make reasonable use of the waters of the stream, regard must be had for the rights of other riparian owners down the stream. Hence, a manufacturer who draws water from a river for cooling purposes in connection with condensing machinery may be enjoined from returning the water heated to such a temperature as to destroy the right of a lower owner to harvest ice which would otherwise form on the river. (United States Circuit Court of Appeals, Seventh Circuit, in the case of Sandusky Portland Cement Company vs. Dixon Pure Ice Company, 221 Federal Reporter, 200.)

MASSACHUSETTS WATER COMPANIES NOW UNDER SUPERVISION OF GAS AND ELECTRIC BOARD.—Officials of the water companies of Massachusetts are having their troubles with the State Gas and Electric Light Commission, over the filing of their annual financial report for the year ending June 30. It is a new procedure for these companies to be under the supervision of any State board or commission, as up to the present year they have only been under such supervision as the legislature itself might enact from time to time, which, in a general way, has amounted to practically nothing. Late in the spring the Commission sent out their blank forms for this annual report, and it carried matters down to very minute details, and further, apparently, than many of the small water companies were in the habit of doing.

ANOTHER NATURAL GAS INCREASE ASKED.—Claiming that the business of the West Side Gas Company has not been up to the estimate made by the California Railroad Commission at the time of the hearing and the setting of the rates a year ago, the owners of the organization have asked for a rehearing and readjustment of rates in keeping with the business done and the profits accrued.

At the time of the hearing by which the rates were set at 70 cents per 1,000 cubic feet, the commission estimated that the business of the company would increase at the rate of 17% a year. The profits of the company were figured on a basis of 9% on the investment.

Financial Notes.

GROSS earnings and net earnings of all properties now controlled by NORTHERN STATES POWER COMPANY are reported as follows:

Month of July	1915.	1914.	1913.
Gross earnings	$369,903	$327,405	$279,115
Net earnings	191,888	168,304	135,964
Seven months to July 31:			
Gross earnings	2,827,650	2,525,303	2,287,742
Net earnings	1,550,510	1,321,246	1,132,847

Operating results for 12 months ended July 31, 1915:

Gross earnings	$4,807,593
Expenses, maintenance charges and taxes	2,146,338
Net earnings	2,661,255
Fixed charges	1,483,569
Balance	1,177,686
Preferred stock dividends	587,069
Surplus available for depreciation, common stock dividends, etc	$590,617

THE DAYTON GAS COMPANY has applied to the Ohio Public Utilities Commission for authority to issue $200,000 first mortgage 5% bonds to equip a local plant to receive natural gas.

THE AMERICAN GAS COMPANY has declared a regular quarterly dividend of 1¾%, payable Sept. 1.

THE BROOKLYN UNION GAS COMPANY declared the regular quarterly dividend of 1½%.

DURING the month of July, the first month in the fiscal year of the CONSOLIDATED GAS, ELECTRIC LIGHT AND POWER COMPANY, that corporation sold 334,220,800 cubic feet of gas, as compared with 311,335,800 cubic feet for the same month of last year, or a gain of 22,885,000 cubic feet. In the electric department this company sold 11,180,004 kilowatts, as contrasted with 10,875,465 kilowatts for the corresponding period of the previous year, a gain of 304,539 kilowatts. The total net gain of gas customers was 30, as against 227 for July last year, while the gain of electric customers was 308, as compared with 310 for last year. The report of the safety committee shows a large decrease in the number of accidents as compared with the previous year. The total number of accidents reported was 330, against 409 for 1914, or a decrease of 29.64%; number of employees injured, 301, as against 361 for last year, or a reduction of 16.62%; number of persons injured other than employes, 25, as against 102 for last year, or a reduction of 75.49%. The report also shows that 4 employees were killed during the year, as compared with one employee for the year previous.

WITH the ninth annual report of the PACIFIC GAS AND ELECTRIC COMPANY, covering the fiscal year ended Dec. 31, 1914, the company published a supplement, giving the results of operations for the first 5 months of 1915, and a balance sheet as of May 31, 1915. The arrangement of the report is an innovation and will hereafter be the company's standard form. The income and surplus account statements appear first, with an analysis of each of the important items in their order; followed by a certified balance sheet with a similar analysis. The physical and operating statistics of each department appear next, with explanatory text and matters of general interest. The report closes with charts. During the 17 months covered by the report, Jan. 1, 1914, to May 31, 1915, the following progress was made:

Gross operating revenue increased	$1,722,990
Total net income increased	1,934,449
Consumers gained—net	39,725
Extensions and additions made at a net cash cost of	3,592,326
Bonds and cash in sinking funds increased by	1,432,015
Current assets increased by	1,973,111
Current liabilities decreased by	3,054,510
Total betterment in current financial condition	5,027,621
Current cash increased	1,035,605
Secured obligations decreased by	3,215,500
Number of stockholders increased	3,916
All one-year notes and floating debt paid, thus eliminating annual interest and discount charges of	622,860

Of the total operating revenues of $16,912,688, $8,759,449 was derived from the sale of electrical energy and $7,015,408 from the sale of gas, the remainder being from electric-railway operations and the sale of steam and water. Electric sales increased by 6.42% and gas sales by 7.14% during 1914. The profit on merchandise sales and other miscellaneous income was $307,816 for the year, or a decrease of 7.65%.

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